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COMPUTERS IN GEOGRAPHY

Compiled by
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PREFACE

This listing is the result of an enquiry which has been in progress since early in 1967, the object of which is to promote the sharing of information on the use of computers by geographers in different research fields. Although originally limited to contributors from the United Kingdom, the scope of the project has been expanded to include entries from anywhere in the world, although the majority are from the United Kingdom and the United States.

It is intended that publication should continue about mid-January of each year and that existing entries will be updated as required and new entries included each year. I would welcome further entries from interested people or Departments which should include the information shown on the questionnaire inside the back cover. May I encourage individuals to submit entries wherever possible rather than corporate entries. This facilitates editing and provides the name of an individual for potential users to contact.

A similar publication for geologists has been operational for some years (GOSSIP) organised and edited by Dr. V. Loudon of the Institute of Geological Sciences, London. As Dr. Loudon has now had to wind up this service it is hoped that this publication can be expanded next year to include entries from geologists and also people outside Universities employed in planning, transportation and other related fields.

I should like to thank all persons who have completed the questionnaire on which this publication is based and I hope that they will send me the necessary updated information for the next edition and encourage their colleagues to send in entries by the closing date for next year's publication, which is 30th September 1970.

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Norfolk, England.

January 1970
Norwich

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As far as possible the entries follow a standard pattern, which is illustrated below. In cases where Departments have contributed corporate entries or where they have such a large number of programs that individual listing of each is not possible, they have been included in the special entries at the end of this volume.

Standard form of entry:-

Name — Official address

Computer used	Core size of machine	Core size of program	Language of program	Peripherals* needed by program

Program written by — Address of author

Description and name of program

Purpose for which the program is being used

* The peripherals are only listed if they are other than: card reader, card punch, paper-tape reader, paper-tape punch and line printer. Where the use of any other peripheral is known to be optional it is listed as such.

The relative location of each type of information is kept constant and any section of an entry about which there is no information remains blank.

1/ Adams, J. — Department of Geography, London School of Economics, Houghton Street, London W.C.2.

IBM 360-65 — Fortran

1/1 by Adams — as above

Calculation of areas, links in transport network, from paper tape generated by D-MAC.

1/2 Allocation of population data to a grid.

1/3 SYMAP program.

Programs used in a study of transport in West Africa.

2/ Aitchison, J. W. — Department of Geography, University College of Wales, Aberystwyth, Wales.

IBM 1620 — Fortran IV
Atlas — Fortran 63

2/1 by Payne, Downe and Aitchison

Least squares fitting. Weaver Thomas classification procedure.

2/2 by Payne

Nearest neighbour analysis. Computes distances for 'n' dimensional space. Prints either the matrix of distances or the nearest neighbour.

2/3 by Payne and Aitchison

Computation of means, standard deviation and standard score. Also performs a distributional count of points within each unit of standard deviation.

2/4 by Aitchison

Use of the Benson/Lehner graph plotter attached to Atlas.

2/5 by Skripter

Sequential grouping of multivariate data by Pythagorean distance.

2/6 by University of Manitoba

A set of programs from University of Manitoba for the calculation of correlation matrices, factor analysis and factor rotation.

Programs are being used to analyse agricultural data on a parish basis for Wales. The aim is to explain the spatial patterns of crop and stock enterprises and to attempt a regionalisation of Wales on a multivariate basis.

3/ Ahnert, F. — Department of Geography, University of Maryland, College Park, Maryland, U.S.A.

IBM 7094 — Fortran

3/1 by Ahnert

Theoretical models of slope development. (Contd.)

Program used to advance a quantitative theory of slope development, with corroboration by field observation.

4/ Alexander C. S. — Department of Geography, University of Illinois, Urbana, Illinois 61801, U.S.A.

IBM 360-40 — Fortran IV

4/1 by Laboratory for Computer Graphics and Spatial Analysis, University of Harvard, Cambridge, Mass. 02138, U.S.A.

SYMAP. Produces maps that show quantitative data by various degrees of shading - or intensity of shading.

Program used to map patterns of alluvial sedimentation on the Black Bottom portion of the Lower Ohio River floodplain. The maps reproduce the distribution of sand, silt and clay at one foot vertical intervals to a depth of seven feet.

5/ Alexander, M. J. — Department of Soil Science, Reading University, Reading.

Elliott 4130 — Fortran IV

5/1 by I. M. Fenwick — Department of Geography, Reading University, Reading.

Ordination: similarities of 30 soil profiles.

Program used to determine the similarity of 30 soil profiles each having 7 recorded parameters in order to establish the variation in soils developed on units 1, 2 and 6 of the Hypothetical Nine Unit Landsurface Model (Dalrymple et al. 1968).

6/ Ambrose, P. — Department of Geography, University of Sussex, Brighton, Sussex.

ICT 1905 — Fortran IV

6/1 by Ambrose — as above

The production of a set of minimum paths through a 104 x 104 matrix.

ICT 1301 — MLP

6/2 by Ambrose

The manipulation of retail and service centre data - cross tabulation of 15 variables relating to retail and service outlets.

The programs are used for predicting the inter-zonal spending power flows that are occurring in the intra-urban study area (the Sussex coast conurbation) in the light of excess or deficiency in turnover observed to occur in each of the 93 zones of the conurbation. The excess and deficiencies are calculated by comparing the supply (the approximated turnover) and the demand (the spending power) in each zone.

7/ Bagan, R. B. — Department of Geography, Sheffield University, Sheffield 10.

ICT Mercury — Mercury Autocode

7/1 by George and Blundell — Computing Laboratory, Sheffield University, Sheffield.

Correlation and multiple regression analysis. Library program No. 1003A (1964).

Program used to show the relationships between air temperatures and temperatures at depth in ice caps and also the relationships between soil loss under simulated rainfall and various soil properties.

8/ Barkham, J. P. — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C.

CDC 3600 — Fortran 4A

8/1 by J. M. Norris — Division of Soils, CSIRO, P. O. Box 109, Canberra City, ACT 2601, Australia.

Canonical correlation. Finds maximum correlations between linear functions of two or more sets of variables.

Correlation of multivariate soil and ground flora data from Cotswold beech woodland.

8/2 Multiple discriminant analysis (known by some workers as canonical analysis). Discriminant functions are calculated in terms of variables for a number of groups of individuals. These groups are displayed in terms of components in a way similar to PCA.

Comparison of Cotswold beech woodlands on the basis of ground flora and groups of vegetation samples from Foula, Shetland.

8/3 Principal component analysis, Q/R (one program).

Primary analysis of ground flora data and soils data from Cotswold woodlands; Brigsteer Wood, Westmorland; Foula, Shetland.

8/4 by M. B. Dale and W. T. Williams — Division of Soils, CSIRO, P. O. Box 109, Canberra City, ACT 2601, Australia.

Partition correlation. Used in conjunction with 8/2 to separate the qualitative and quantitative parts of data. Thus, three data sets are produced: total (t), N and L.

Program used to investigate the relative importance of N and L parts in the rather diffuse ground flora data from Cotswold beech woodlands.

9/ Barnes, F. A. — Department of Geography, University of Nottingham, Nottingham.

KDF 9 — Atlas Autocode

9/1 by Barnes — as above

Factor analysis.

(Contd.)

KDF 9 Egdon Fortran

9/2 Vector analysis (rotated) Q-mode. Vector analysis (rotated) R-mode.

9/3 Cluster analysis on R-mode factors.

Programs used for analysis of allotments situation in large towns, based on questionnaire data. (Committee of Inquiry into Allotments). The object was to identify regional variation not apparent from inspection.

10/ Barry, R. G. Department of Geography, Southampton University, Southampton.

Duece Machine code

10/1 by Barry and A. Kirk

Three programs for the calculation and monthly averaging of specific humidity and vapour transport at eight levels and their sum between the surface and 500 mb.

Pegasus Machine code

10/2 by Barry and P. Samet

Statistical treatment of climatic parameters.

CDC 3100 Fortran 3200

10/3 by Barry and K. Shimizu

Program F 10398 (Dept. of Energy, Mines and Resources). Same as 10/1 above. Ancillary programs for checking aerological data cards and incorporating estimates for missing values.

Programs 10/1 and 10/3 were used in studies of atmospheric vapour transport over north-eastern North America. Program 10/2 used for a synoptic climatological studies of central southern England.

11/ Bateman, C. (Mrs) 4 Pilgrims Way, Gilesgate, Durham City.

ICL KDF 9	32K	3.5K	Algol	11 inch x-y Calcomp drum plotter

11/1 by Bateman as above

Contour drawing. Values to be contoured placed in a regular grid. The program uses Dayhoff's method (Dayhoff, M. O., 'A Contour Map Program for X-Ray Crystallography.' Communications of the A. C. M., 6 (1963) 620) and results are output onto paper tape. This is then used as data for the x-y plotter which connects the points with straight line segments.

Program used for the drawing of contours on Hydrographic Charts. Other programs place the data in a regular array and do any required interpolation. This program is very general and has been used in many fields including Chemistry and Mathematics as well as Geography.

(Contd.)

ICL KDF 9	32K	7.5K	Algol	Paper tape reader, 11" x-y Calcomp drum plotter

11/2 Contour drawing using the Calcomp plotter.

Program used for same drawings as in program 11/1. The main advantage of this program is the omission of the output of x and y co-ordinates on paper tape in order to do the drawing. This program can only be used with the Calcomp plotter connected to the KDF 9, whereas program 11/1 produces paper tape which can be used to control any x-y plotter.

12/ Berry, B. J. L. et al. Department of Geography, University of Chicago, Illinois 60637, U.S.A.

IBM 7094/7040 32K Fortran II Fortran IV

12/1 by Prof. Neely Department of Biology, University of Chicago, Illinois, 60637.

NEELY (UCSL 501). The centroid and Ward's criteria grouping algorithms for similarity and dissimilarity for up to 220 points. Grouping may be done with a contiguity restraint. A complete linkage tree is printed.

12/2/3/4 by graduate students Department of Geography, University of Chicago, Illinois 60637.

THRNT48 (UCSL 506), THRNT56 (UCSL 507) and KOEPPEN (UCSL 508) respectively. These three programs make climatic classifications based on various types of data.

12/5 by P. Lankford Department of Geography, University of Chicago, Illinois 60637.

DONNA (UCSL 701). Computes statistics on the distribution of points in a plane employing data whose location is given in terms of an arbitrary grid. Statistics computed are the Poisson distribution, a chi square test of the Poisson distribution, Clapham's test of the Poisson distribution, and Fisher's index of dispersion. The program groups the frequency distribution to make the best use of the various statistical measurements. Modifications are currently in progress to allow the regrouping of cells to test the distribution with various sized grid cells.

12/6 by R. Earickson Department of Geography, University of Hawaii.

POPTEN (UCSL 704). Computes potential model for a set of points; used in research.

(Contd.)

12/7 by P. Lankford as above

DIST (UCSL 800). Designed for rapid computation of the great circle distance and azimuth between points on the earth's surface. Input consists of latitude and longitude of points. Output, consisting of kilometers, miles, azimuth and arc distance, may be printed, punched and written on a special data tape.

Program used for research on migration and trade flows.

12/8 by R. Earickson as above
and modified by
P. Lankford

QUICKR (UCSL 803). An extremely fast, in core, two variable regression program with scatter plots. Stores up to 500 observations on 20 variables. More observations may be entered at the expense of the number of variables.

12/9 by K. Casetti

CASETTI (UCSM 503). Classification of points by discriminant iterations on a maximum of 150 observations divided into a maximum of 20 subsets.

12/10 by graduate students — Department of Geography, University of Chicago, Illinois 60637.

MAPPER (UCSM 504). This program calculates, for any aspect of 26 common projections, the Cartesian coordinates of the intersections of designated parallels and meridans.

12/11 by Kaiser

KAISER (UCSM 505). Classification based on 'An Objective Method for Establishing Legislative Districts'. Groups based on similarity as well as spatial compactness. Used in research.

12/12 by P. Lankford as above

GRIDPLOT (UCSM 601). Constructs various types of contoured surfaces for gridded data. The number of columns in the grid may not exceed 42 for any one plot but there is no limit to the number of rows.

12/13 by Department of Geology — University of Kansas, U.S.A.

SINGLE (UCSM 701). Computes single Fourier series for up to 300 points. Plots of the observed data, calculated values and residual values are produced as well as the equation used and various statistical measurements.

12/14 by L. Goodman — Department of Statistics, University of Chicago, Illinois 60637.

modified by P. Lankford

(Contd.)

INDIFF (UCSM 702). A generalized program for the analysis of transaction flows. Program removes size effect from a matrix (order not to exceed 120) and tests the assumption that the flows are indifferent to all parameters but the total volume of transactions that each actor sends to and receives from all other actors associated with his nonblank entries. Various statistical tests are included.

12/15 by State Geological Survey — University of Kansas, U.S.A.

TREND6 (UCSM 703). Computes and plots trend surfaces and residuals, degrees 1 through 6. Can handle 500 points. Output includes equations, computed values and residual values for each data point as well as plots of all surfaces.

12/16 by D. Good — University of Kansas.
modified by P. Lankford

COORD (UCSM 705). Converts section, township and range notation to cartesian coordinates.

12/17 by W. T. Fox — University of Kansas.
modified by P. Lankford

TIMER (UCSM 708). Calculates and plots time trend curves. Produces a series of smoothed curves based on a sequence of observations. Nine smoothed curves are computed with varying degrees of smoothing for each of ten variables with up to 500 observations per variable. Statistical measurement of the smoothing curves are given.

12/18 by W. R. James — University of Kansas.

DOUBLE (UCSM 719). Computes a double Fourier series for irregularly spaced data for up to 200 points. The basic purpose is to compute the coefficients of selected double Fourier series terms by the least-squares method. The coefficients to be derived are selected by the investigator prior to computation and may be selected to isolate trend surfaces on any basis desired. Three options are available. The first is the computation of trend and residual values at each point, data mean and variance, and the reduction in total corrected sum of squares of the data due to removal of the trend, the F ratio calculated from variance estimates made from the trend and residual surface. Option 2 is a continuous symbol map of the trend surface produced. The third option provides a total Fourier series fit to the observed values and also includes options 1 and 2.

12/19 by Department of Geography — University of Iowa, U.S.A.

(Contd.)

GAC (UCSM 720). Generalized analysis of linear covariance. This program provides an analysis of the homogeneity of regression between a single dependent variable and up to 9 independent variables for a maximum of 10 groups. The number of observations in each group may be unequal but the total of all observations may not exceed 1,000 points. The program computes Bartlett's test for the homogeneity of variance within groups for the dependent variable at the 0.05 level. If the test is significant, the option is available whether to cease or continue the subsequent regression-covariance analysis. A regression analysis is provided for each of the groups and the aggregated data and also a test for equality of regression in the k groups. A table of residuals from each regression is also provided.

12/20 by E. Casetti and R. K. Semple — Department of Geography, University of Toronto.

TRENDC (UCSM 721). Trend surfaces based on the correlation of variation of a group of points and the major trend. That point for which the correlation is highest is identified and extracted from the surface variation and the process continues until all variation is accounted.

12/21 by Laboratory for Computer Graphics and Spatial Analysis, Harvard Center for Environmental Design Studies, Graduate School of Design, Harvard University, Cambridge, Massachusetts 02138.

SYMAP (UCSM 810). A well known elaborate plotting program for up to 1,000 points. Does chloropleth, proximal and contour mapping.

These computer programs are used extensively by the Department of Geography of the University of Chicago. The major use is in research but some are used mostly in classroom exercises in spatial analysis.

13/ Binns, A. C. — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C.

Atlas — 90 Blocks — Fortran V

13/1 by Binns — as above

Flux standard program computes average monthly water vapour fluxes.

13/2 Divergence total flux program computes integrated flux divergences (monthly averages).

13/3 Wind divergence test program computes $\int \nabla_H V$ by Bellamy triangle method.

13/4 Flux time-height program computes fluxes of water vapour for nine (vertical) levels for each 12 hourly observation per month.

13/5 Divergence time-height program computes integrated flux divergences for each 12 hourly observation per month.

Programs used for research topic 'An analysis of water vapour flux over the British Isles'. (Contd.)

ICL 1905 E — 7K — Fortran IV

13/6 by Binns and C. J. Horn

Cluster Analysis program. Statistical cluster analyses performed.

Program used for statistical analysis of meteorological data and census data.

14/ Bolwell, L. — See Clarke, B. 21/5

15/ Bowland, J. A. — Department of Economics and Geography, University of Salford, Salford 5.

KDF 9 — Algol

15/1 by J. Whittaker — Department of Sociology, Keele University.

and J. F. Hall — Department of Transportation and Environmental Planning, Birmingham University, Birmingham.

Survey data transfer, correction, editing, tabulation package. Tabulation in up to 3 dimensions. Chi-square testing.

Program used for survey of religion and politics in Chorley and Salford.

16/ Boydell, A. N. — University of Calgary, Calgary 44, Alberta, Canada.

IBM 360 — Fortran H

16/1 by J. E. Klovan — Department of Geology, University of Calgary, Calgary 44.

Q-mode factor analysis.

Program used for determination of depositional environments of sands from analysis of their grain size frequency distributions.

17/ Brunger, A. G. — Department of Geography, Trent University, Peterborough, Ontario, Canada.

GE 425 — 32K — 8K — Fortran IV

17/1 by M. W. Scripter — Department of Geography, San Fernando State College, California, U.S.A.

CMAP - a simplified Fortran program which illustrates the scan-line algorithm for making choropleth maps on computer line-printers.

Program used for automated mapping section of Cartography course and choropleth mapping generally.

18/ Carr, A. P. et al.

Physiographical Section,
The Nature Conservancy Furzebrook
Research Station, Near Wareham,
Dorset, BH20 5 AS.

Orion

18/1 by Carr et al. as above

Statistical analysis of beach material from Chesil Beach. Development to include analysis of metamorphetric data and information on waves and tides.

19/ Carter, F. W.

Department of Geography,
University College, Gower Street,
London W. C. 1.

IBM 360/65 7,000 Bytes Fortran G

19/1 by R. Golding University College of London Computing Centre, London.

Computes Eigenvalues for a n x n connectivity matrix.

IBM 360/65 100,000 Bytes Fortran G

19/2 by F. R. Pitts University of Hawaii.

Adaption of Powerflex (flexible powering program). Gives short path matrix plus full powered matrix of an n x n connectivity matrix.

Programs used in analysis of medieval trade routes in the Balkan Peninsula and centrality of early Serbian capitals.

20/ Chick, N. K. et al.

Department of Geography,
University of Tasmania, Box 252 C,
G. P. O., Hobart, Tasmania,
Australia 7001.

Elliott 503 8K main 16K backing 8K 503 Algol

20/1 by Chick as above

Sedimentary Analysis, U1148. Program for numerical and verbal description of sediment samples. It will accept data in a wide variety of forms and has many optional features. Output, with all options operating is as follows: sample number; remarks or latitude, longitude and depth; data for drawing a non-interpolated cumulative curve (sieve ϕ values, sieve contents in grams, weight per cent, cumulative weight per cent); original sample weight, total sieve weight, percentage difference or error; interpolated weight per cent, using continuous parabolic interpolation; the sediment mode/s, median, mean, standard deviation, skewness and kurtosis, using interpolated or uninterpolated data, by the method of moments; Folk and Ward graphic parameters and Inman graphic parameters using non-linear interpolation; Pelto's relative entropy; verbal parametral descriptions based on Folk and Ward values; verbal textural description using the system of Folk, 1954, if the sample has a range of from gravel to clay, or using a parallel 21 class system devised by the author for nomenclature of beach sediments; (Contd.)

verbal textural description, using the system of Shepard, 1954, if the sample has a range of from gravel to clay, or using a parallel 10 class system devised by the author for description of beach sediments; numerical data for drawing sediment texture diagrams; numerical results as a data tape for use by other programs such as correlation programs and plotting programs.

20/2 Coastal Sediments, U1314. This program is a simplification of the program 20/1, Sedimentary Analysis, U1148. Its use is restricted to the analysis of coastal sediments within the range coarse silt to gravel (4ϕ to -4ϕ) and a sieve interval of 0.5ϕ.

The program is used to study the geography of Tasmanian beach sands and to study the relationships existing between beach form and content and the morphology and content of coastal dunes.

20/3 Sediment Distribution Curves, U1198. This program uses the same data tape as prepared for program 20/1, Sedimentary Analysis, U1148. Using a procedure for the parabolic interpolation of values between input data points, the program plots a curve (for each sample on the tape) on an arithmetic probability scale for the cumulative percentage weight and a simple linear scale for the grain size in ϕ units.

Program used for visual presentation of sedimentary distribution parameters.

20/4 Plots of Parameters, U1203. This program is used to plot point symbol graphs showing the relationship between various grain-size parameters but can readily be adapted to plot relationships between many types of numerical data. A variety of point symbols can be used for the plot.

20/5 by A. Goede and N. K. Chick as above

Pebble Analysis, U876. Used to examine the statistics of the distribution of shape and roundness characteristics of sedimentary particles, measured in three dimensions. The program classifies the sphericity form of each particle into one of ten form classes. Mean values of a, b, c and r are then computed. Both Waddell (1934) and Sneed and Folk (1958) sphericity indices are computed, as are Cailleux (1945) and Kuenen (1956) roundness indices. The program computes the minimum, mean and maximum values, as well as the variance, standard deviation, kurtosis, skewness and histogram data for the distribution of values of each index, in addition to correlation and regression line data for the six possible combinations of the four indices.

Program used to study the morphometry of pebbles from riverine and marine environments in south-eastern Australia and Tasmania.

20/6 by Chick as above

Graphic Grainsize Parameters, U935. This program uses data from hand drawn cumulative percentage weight curves on arithmetic probability paper using Krumbein's ϕ scale. The program calculates for n samples approximations to the four standard grainsize parameters: mean, standard deviation (sorting), skewness and kurtosis. A triangular intercorrelation matrix is then developed and output to indicate a relationship between the graphic parameters. (Contd.)

Program used to study the relationships existing between the various graphic approximations to the moments of grainsize distributions.

20/7 Plane Projection Roundness and Sphericity Parameters, U869. This program uses the values of the long and medium axis, minimum radius of projected curvature and the grain projection area to calculate roundness and sphericity of sand grain particles. The grain projections are normalized to 7.00 cm. The program outputs values for minimum, mean and maximum, second, third and fourth moments of roundness and sphericity, as well as Pearson's product moment coefficient of correlation and regression line data for the relationships between roundness and sphericity.

Program used in connection with studies of Tasmania beach sands and the relationship between the form and content of beaches and the sand dunes at their rear.

20/8 by J. Pritchard

Correlation, U997. 74 variables, outputs triangular matrix of coefficients.

20/9 by N. K. Chick

Correlation and Standard Error, U998. As for 20/8 but with the standard error of the coefficient.

20/10 Correlation and Standard Error, 2 Matrices, U999. Outputs an n by n correlation matrix 2 standard error values.

Elliott 503 8K main 16K backing — Algol 3

20/11 Intercorrelation, U1423. Will accept 127 variables. Also supplies mean, variance and standard deviation of each variable.

20/12 Vectorcorrelation, U1423/4. Will accept 180 variables in one form or 195 in a later version. Intercorrelation matrix is converted into a vector for optimum use of space. Various options are available.

Correlation programs have many uses, mostly preliminary analysis of data prior to use of factor analysis, etc.

21/ Clarke, B. G. — School of Environmental Sciences, University of East Anglia, Norwich NOR 88C.

ICL 1905 E — Fortran

20/1 by P. Carpenter — County Treasurers Department, West Sussex County Council.

Cohort fertility, survival and migration programs. IMM, PROP 1, PROP 2.

Program used to provide a range of population projections for Crawley New Town and surrounding area.

(Contd.)

IBM 360 — Fortran

21/2 by D. Hitchins — University of Sussex.

Survey analysis and data retrieval, with percentaging.

Crawley New Town data bank.

21/3 by West Sussex County Council (County Planning Dept.)

Analysis of land use data used for summing detailed town centre land use and floorspace data in Crawley Town Centre.

21/4 by West Sussex County Council (County Planning Dept.)

Analysis, presentation and summation of car parking turnover in Crawley Town Centre. Turnover shown for individual car park areas, for different vehicle types, different time periods, space usage, etc.

ICL 1905 — Fortran

21/5 by D. Hitchins — University of Sussex.

Standard correlation and regression program for two variables.

Used for analysing retail turnover for Crawley New Town. Used jointly with D. Stoppard for analysing national industry and employment data. Used jointly with L. Bolwell for analysing regional retail data (shoppers interview), for relating newspaper readership, social class and income levels in and around Crawley when trying to isolate an accurate social class indicator.

22/ Clark, D. G. — Department of Economics and Geography, University of Salford, Salford 5.

KDF 9 — Algol

22/1 by J. Whittaker — Department of Sociology, Keele University.

and J. F. Hall — Dept. of Transportation and Environmental Planning, Birmingham University, Birmingham.

Survey data transfer, correction, editing, tabulation package. Tabulation in up to 3 dimensions. Chi-square testing.

Program used for survey of backgrounds of managers in banks and building societies.

23/ Clayton, K. M. — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C.

ICL 1905 E — ICL 1900 PLAN 3 — 3 Magnetic Tape Drives

(Contd.)

23/1 by M. J. A. Garth — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C.

A suite of programs with the general title 'Index' which are the basis of a magnetic tape orientated keyword indexing system. The programs create validated input magnetic tapes from punched cards, write indexed entries, print the index and maintain the data base files.

Program used for creation of a consolidated index to the four volumes of Geographical Abstracts. The system is a redesign of an earlier version developed for the IBM 1440.

24/ Compton, P. A. — Department of Geography, University of Sheffield, Sheffield 10.

Elliott 803 — Elliott Autocode

24/1 by Elliott Ltd and Statistics Dept, University of Sheffield

Matrix analysis and the calculation of Eigen values and vectors.

24/2 The calculation of the straight line distances between orthogonal co-ordinates.

Programs used in studies of migration and the estimation of future regional population distribution.

25/ Cook, B. G. — Division of Land Research, CSIRO, P. O. Box 109, Canberra, A. C. T. 2601, Australia.

CDC 3600 — 32K — 12K — Fortran — digital plotter

25/1 by Cook — as above

STERPLOT. Plots stereograms of the distribution of points in three dimensions.

Program used to display the results of ordination programs.

26/ Crofts, R. — Department of Geography, University of Aberdeen.

ICL 4/50 — Fortran IV

26/1 by Crofts — as above

DISTRIB to calculate Folk and Ward mean, sorting, skewness and kurtosis values from input of percentiles from cumulative frequency curve.

26/2 by J. Thornes modified by J. Evans — London School of Economics. Oxford Regional Hospital Board.

PEBPROBS. Calculation of Folk and Sneed, and Cailleux shape indices and classes.

Programs used for analysis of littoral sands, comparing grain size distributions of beach, dune and river sands.

27/ Dahms, F. A. — Department of Geography, University of Guelph, Guelph, Ontario, Canada.

IBM 360-50 — 30K — WATFOR adapted Fortran IV

27/1 by Dahms — as above

Journey to Work Program. Classifies persons making work journeys amongst 360 zones by income, mode, occupation, travel time, sex, land use at destination zone. Summarises for various agglomerations of zones, calculates percentages, etc.

Program used for analysis of socio-economic and planning implications of data from O - D traffic surveys. Assists in understanding the functional linkages and socio-economic characteristics of the city.

28/ Davies, I. G. — Lakehead University, Port Arthur, Ontario, Canada.

IBM 360/40H 256K — 110K approx. PL/1 F

28/1 by J. M. Meaden — Lakehead University.

GEOG. The program forms totals of the responses to all questions in a questionnaire survey.

Program is being used to analyse the results of a survey of consumer habits in North Western Ontario.

29/ Davies, J. L. — see N. K. Chick 20/2

30/ Davies, R. L. — Department of Geography, University of Newcastle upon Tyne.

Elliott 803 — 8K — Elliott Algol — Graph plotter

30/1 by R. L. Davies and F. C. Nex — as above. Lanchester College of Technology, Coventry.

Point Referencing Program. Produces dot maps and/or allows up to four data items to be arranged about any point location. A subroutine allows any reasonable addition, subtraction, multiplication and division of the raw data input.

Program primarily in use for plotting shopping characteristics in Coventry.

30/2 Histogram Program. Produces histograms with frequencies denoted along the Y axis and cell descriptions along the X axis. A subroutine allows for mathematical manipulation of the raw data.

Program used for summaries of consumer movement survey data.

30/3 Potential Gravity Model. Generates potentials at any reasonable number of destination points for the Lakshmanan and Mansen model.

Program used in a variety of student project works. (Contd.)

30/4 Accessibility Gravity Model. Generates accessibility values at any reasonable number of origin points using a crude, standard formula.

Program used in a variety of student project works.

30/5 Spearman Rank Correlation. Computes coefficients for any reasonable number of rank sequences.

Program used to compare the relationships between alternative rank variables in central place and gravity model studies.

31/ Davies, W. J. — Department of Geography, University of Port Elizabeth, P. O. Box 1600, Port Elizabeth, C. P., South Africa.

ICL 1901A

31/1 by Davies — as above

Programs will be developed in the fields of urban geography and photo-interpretation.

32/ De Souza, A. R. — Department of Geography, University College London, Gower Street, London W. C. 1.

Atlas — Fortran IV

32/1 by T. V. Loudon

Single linkage cluster analysis.

32/2 Component analysis.

Programs used to sort out the most meaningful variables, for the delimitation of homogeneous social tracts in cities, from readily available Census Enumeration District statistics.

33/ Douglas, I. — Department of Geography, University of Hull, Hull, E. Yorkshire.

Elliott 803 8K — Elliott Algol

33/1 by P. Lewis

Correlation analysis.

33/2 by A. F. Pitty

Regression analysis and data transformation.

33/3 by I. Douglas — as above

Regression and correlation analysis and data transformation.

Programs used in the calculation of the rates of denudation from discharge measurements and the results of analysis of water samples. Also an analysis of the factors affecting stream flow and water quality.

34/ Duffield, B. S. — Department of Geography, University of Edinburgh, High School Yards, Edinburgh.

Atlas — Algol 60

34/1 by J. R. Tarrant — School of Environmental Sciences, University of East Anglia, Norwich NOR 88C.

and Duffield — as above

Agricultural survey program. Analysis of parish agricultural returns at different periods of time.

Elliott 803 8K — Elliott Algol

34/2 by Duffield — as above

Calculation of an Index of Specialisation, using cumulative percentages (Agricultural data).

34/3 Analysis of individual farm returns using standard man-day conversion factor.

34/4 Analysis of individual farm returns using gross margin data.

34/5 by Duffield and M. K. Francis — as above

(1) One sample runs test and chi square test.
(2) Kruskal-Wallis H. test.
(3) Kendall coefficient of concordance W.
(4) Friedman two-way analysis of variance (for matrix).
(5) Spearman's Rho correlation (for matrix correlation) and 't' test.
(6) Mann-Whitney U test (for matrix comparison) and 'Z' test (significance).
(7) Wald-Wolfowitz runs test (for matrix comparison).
(8) Wilcox matched pairs signed ranks test (for matrix).
(9) Spearman's Rho (for matrix correlation), regression equations and standard errors.
(10) Students 't' test and 'f' test (for matrix).
(11) Tests for normality (for matrix) - (mean, standard deviation, skew, kurtosis).

Programs 34/5 suitable for testing association and correlation between all types of data. Further details available from Duffield.

35/ Earickson, R. J. — Department of Geography, University of Hawaii, Honolulu, Hawaii, 96822.

IBM 360/65 512K	188K	Fortran IVG	1 scratch tape or disk unit

35/1 by R. Earickson — as above

PLOTTER. A program which produces two-variable scattergrams, histograms of several variables, and performs simple regression-correlation problems on samples of several thousand observations.

(Contd.)

IBM 360/65 512K 150K Fortran IVG

35/2 by R. J. Earickson as above

TRANDATA. A program which fully prepares a data deck for the out-of-kilter transportation problem. The program links directly to a transportation problem routine which was written elsewhere. The user is able to specify distance maxima over which no paths are produced, or is able to specify that all paths are desired for any given source or sink area. Distance weights may be provided which correspond with 'code' letters on sources or sinks.

35/3 POPTEN. A program which computes the point potentials of all points in a study area, which are identified as x-y coordinate locations, and have variable weights.

IBM 360/65 512K 208K Fortran IVG

35/4 modified by C. Wall University of Hawaii, Honolulu, Hawaii 96822.

CLUSTR. A program which partitions objects into optimally homogeneous groups on the basis of empirical measures of similarity among those objects. Two methods are used in the program to form clusters. The diameter or maximum method forms clusters that are optimally 'compact'. The connectedness or minimum method forms clusters that are optimally 'connected'. The program will treat up to a 100 observation by 100 variable input matrix. The program is commonly used to group factor scores obtained from principal components analyses.

36/ Eden, M. J. Bedford College, London N.W.1.

IBM 1130 Fortran

36/1 by R. P. Hale Department of Mathematics, P.O. Box 1144, Boroko, Papua and New Guinea.

Plant-environment correlation in lowland New Guinea. Sorting operation to identify correlations existing between 11 environmental variables described at 1750 sites.

Program used as aid to understanding savanna-forest distribution and the factors responsible in lowland New Guinea.

37/ Ellenby, J. Regional Computer Centre, Edinburgh, Scotland.

G.E. 265 Fortran IV

37/1 by Ellenby as above

Development of a set of statistical routines to assess the use of computer time-sharing in teaching programming and statistics to geographers.

37/2 Work on a message handling structure in the form of two look-up tables and a set of message files - in connection with above.

(Contd.)

37/3 Work on automatic documentation system for use with above. Work on system to trap user statistics on how student is using the above system.

These developments are to be used in the teaching of statistics and programming to first year BA/BSc students in the Department of Geography at LSE.

IBM 7090/94 11 Fortran IV and MAP Stromberg-Carlson 4020 cathode-ray tube and micro-film plotter

37/4 A fairly comprehensive system of computer graphics sub-routines specifically designed to enable applications programmers to obtain thematic maps, graphs etc. from their programs. To date there are 108 sub-routines in the system and 34 additions will be inserted shortly.

38/ Evans, I. S. R.C.A. Experimental Cartography Unit, 37a St. Giles, Oxford.

Titan 128K 3.1K Titan Autocode

38/1 by Evans as above

The analysis of 2-D azimuthal distributions. Gives resultant vector strength and the 95% limits on its azimuth (vector mean of distribution). Rayleigh's chi square and variance ratio significance tests included. Two versions, either accepting individual azimuths to be equally weighed or class frequencies and mid points as input data. A modification is available to assess the three significance tests.

Titan 128K 19K Titan Autocode

38/2 Altitude-specific analysis of stream azimuths. Program calculates length, slope length, azimuth and gradient of each inter-contour stream segment, plots long profiles and calculates height-length integrals at each stage, and performs azimuthal analysis as program 38/1 for each altitude for stream length, mean length or mean gradient, and finally repeats this analysis pooling up to 13 adjacent altitudes.

Titan 128K 5K Titan Autocode

38/3 Slope analysis. Program calculates gradient and azimuth of slope between adjacent contours. Form of slopes in geomorphic region or altitudinal belt summarised.

Titan 128K 19K Titan Autocode

38/4 Measurement of slope at a point, from coordinates of 5 points.

Programs used for the measurement of asymmetry (e.g. cirque aspects) produced by mountain glaciers. However, they could be applied to many other examples of unimodal asymmetry.

(Contd.)

Titan 128K 8K Titan Autocode Plotter

38/5 Samples. Several programs for taking many samples of 25 or 100 from a 50 x 50 matrix, according to random, stratified random, systematic stratified unaligned, rectangular grid, square grid and hexagonal grid procedures. Each sample provides estimates of population mean and variance, and the variance of these estimates indicates the precision of the sampling procedure for the 50 x 50 matrix used. Sample patterns may be plotted.

Program used to test the precision of these various areal point sampling procedures.

39/ Fenwick, I. M. Department of Geography, University of Reading, Reading.

Elliott 4130 32K Fortran IV MT Units (2)

39/1 by D. R. Ingram Department of Geography, McMaster University, Hamilton, Ontario.

modified by
I. M. Fenwick as above

MULTI. Multiple regression program with listing of original data, residuals, etc.

39/2 TREND. Trend surface analysis with graphical output produced on line printer.

Programs used for analysis of rural non-farm population densities in Minnesota. 39/2 used for analysis of variations in $CaCO_3$ content in terrace soils around Reading.

40/ Fielding, G. J. University of California, Irvine, U.S.A.

IBM 360-50 super basic and Apl. typewriter terminals
SDS Sigma 7

40/1 by Fielding as above

Instructional programs for core concepts in geography. Ten segments completed which simulate various models in cultural geography.

Computer-Assisted Instruction can be translated into various computer systems and is now operating on a commercial time-sharing network.

41/ Fletcher, P. G. University of Queensland, St. Lucia, Brisbane, Queensland, Australia.

GE 225 8-16K GAP magnetic tape unit

41/1 by General Electric Computer Department (1964)

G.E. Compatibles/200 Transportation Program No. CD225D7.007 uses Vogel's Approximation Method and the Modi Method to solve a linear programming formulation of the transportation problem. The program also undertakes shadow price calculations (yielding penalties incurred for using non-optimum allocations). (Contd.)

Program used to determine an optimum location pattern of butter factories on the Darling Downs of south-east Queensland. A transshipment transportation formulation is used, minimizing the total costs of cream collection, butter production and distribution. An iterative procedure is used so as to allow for economies of scale. Processing costs are set at the minimum points of the cost curves at the start of the first run and respecified after each run according to output indicated by the previous run, until in a final respecification no adjustments need be made. The solution yields the optimum size, number and locations of factories, product flows and location rents.

42/ Foot, D. H. S. Department of Geography, University of Reading, Reading.

Elliott 4130 32K Fortran IV Magnetic tape units (4)

42/1 by Foot as above

Employment-Population Model on the lines of I. S. Lowry. From a given distribution of basic employment, the residential population and retail employment is allocated over the region. Programs are operational for several distribution functions. There is continuous development of the programs.

Programs developed in Bedfordshire County Council to help in the production of the County Development Plan. (Now being more widely developed at Reading).

43/ Frank, R. Department of Biogeography and Geomorphology, Australian National University, Canberra, ACT Australia.

IBM 360 Fortran IVG

43/1 by M. Rose Australian National University, Canberra, ACT Australia.

Calculates latitude, departure, height difference and horizontal distance of low accuracy cave surveys. Also calculates corrections for closed traverses, or traverses with a known starting and ending point. Data required are azimuth, measured distance and vertical angle. Printout produces the information as individual units and cumulatively, both uncorrected and corrected.

Program used for cave surveys, as well as other low accuracy surveys using tripod mounted Brunton, Mider's Dial or comparable instrument with tape.

44/ Furley, P. A. Physical Geography Laboratory, Edinburgh University, Edinburgh.

KDF 9 changing to IBM 360-50 and ICL 4-75 Atlas Autocode and Fortran

(Contd.)

44/1 by Regional Computing Centre — Edinburgh

MULTREG. A series of programs involving various types of multiple regression analysis.

Program used for analysing soil property changes over slope transects.

45/ Gant, R. L. — Department of Geology and Geography, Kingston College of Technology, Penrhyn Road, Kingston upon Thames.

Atlas — MVC

45/1 Multiple Variate Counter (MVC). Questionnaire survey analysis.

Program used for analysis of social survey data. One thousand household questionnaires from a group of villages in S. E. Monmouthshire have been coded and, after processing by the system, tables of selected variables have been produced.

46/ Garth, M. J. A. — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C.

ICL 1905 E	32K	Fortran IV mainly, some Plan	Magnetic tape drives (3) Exchangeable disc (1)

46/1 by Garth — as above

An integrated data and simulation system is being developed for the study of stochastic and deterministic models of slope development. Facilities include the handling of climatologic, hydrologic and morphological data derived from documentary sources and information derived via field data loggers to provide an information base for model building. Long term data storage is on magnetic tape files which have a key structure designed to permit selective retrieval and processing. A set of simulation procedures is under development for a variety of slope processes. Wherever possible programs are written in Fortran IV, although some routines require the machine oriented assembly language Plan 3.

Program used for development of stochastic and deterministic models of slope development applied to upland valleys in the Brecon Beacons, South Wales.

47/ Gaudeau, C. — C. N. R. S. Laboratoire de Recherches Avancees en Moyens Informations, 23 Rue du Maroc, Paris 19, France.

3600 CDC	64K	Fortran IV

47/1 by P. Gaudeau — as above

Mathematical model of the 78 and 200 year cycles in sunspots, and comparison with observation, etc.

Program used by D. J. Schove, 119/ .

48/ Gergel, T. J. — Department of Geography, Florida State University, Tallahassee, Florida 32303, U. S. A.

CDC 6400 — Fortran IV

48/1 UCLA Biomedical Program BMD 03M. Factor analysis.

48/2 by E. Casetti — Ohio State University.

MESA 502. Regionalization by pairwise comparison of a distance measure computed for each case. Similarity of scores result in the two cases involved being combined into a single group and a centroid value computed to represent the two-member group. Linkage analysis. Very successful, but limited as written to 150 cases as a maximum number for comparison and grouping.

Programs used for regionalization of marsh types along the east coast of the United States. Scores used for each case to compute its distance value are factor scores of each case on five factors isolated.

49/ Gibson, L. J. — Department of Geography - BPA, University of Arizona, Tucson, Arizona 85721.

CDC 6400 — Fortran

49/1 by Biomedical Computer Programs — University of California, Los Angeles.

Simple data description, correlation with transgeneration and description of strata with histograms.

49/2 Factor analysis.

49/3 Stepwise regression.

50/ Girt, G. L. — Department of Geography, University of Leeds, Leeds.

KDF 9 — 32K — Algol 60

50/1 by E. E. L. M. and Library tapes — University of Leeds, Leeds, Yorkshire.

Multiple regression, correlation and variance analysis. Principal component analysis.

Programs used for the isolation of certain variables thought to be connected with the causation of the pattern of chronic bronchitis morbidity in Leeds. Also the calculation, using regression models, of the risk of contracting this disease through exposure to those variables.

51/ Gittins, C. M. — Department of Geography, University College London, Gower Street, London W. C. 1.

Pegasus — Machine code

51/1 by W. T. Williams and J. M. Lambert

Association analysis. (Contd.)

Program used for a vegetation study of heathlands in terms of the species complement and habitat factors.

ICT 1900 Machine Code

51/2 by MacNaughton-Smith

Predictive attribute program.

Program used for prediction with regards to species and habitat relationships.

52/ Gleave, M. B. et al. Department of Economics and Geography, University of Salford, Salford 5.

KDF 9 Algol

52/1 by J. Whittaker Department of Sociology, University of Keele.

and J. F. Hall Department of Transportation and Environmental Planning, Birmingham University.

Survey data transfer, correction, editing, tabulation package. Tabulation in up to 3 dimensions. Chi-square testing.

Program used for pilot survey of Central Lancashire New City Area.

53/ Goddard, J. with N. Spence Department of Geography, London School of Economics, Houghton Street, London W. C. 2.

IBM 7090 Fortran II & IV

53/1 by Hendrickson and White

Factor analysis with varimax and promax rotations.

Program used in a multivariate analysis of activity patterns in the centre of London. Employment in 80 different types of offices as recorded over 200 street blocks has been examined to recognise groups of spatially linked activities and underlying dimensions in the variation of employment in part of central London. Program also used for factor analysis of employment in 24 S. I. C. order groups recorded over 88 counties in order to analyse basic patterns of variation at this scale and to produce factor scores as input to a regionalisation program.

53/2 by Goddard as above

Concentration indices package. Location quotient, coefficient of localisation, index of surplus workers (after Mattila and Thompson Land Economics, 1955), mean centre and standard distance (after Bachi, Reg. Sci. Assoc. Papers, 1963).

53/3 by Ellenby, Goddard and Sant

Population potential. Program reads x, y co-ordinate values for centroid of each place and computes Pythagorean distance matrix. Mass factors then read and potential of each place computed. (Contd.)

53/4 by Neely

Hierarchical grouping with contiguity constraint. Program computes matrix of squared (Euclidean) distances for raw data of n observations and p variables (these may be factor scores). The geographical contiguity matrix is superimposed on the distance matrix as + and - signs. At each step in grouping procedure two most similar groups (either single or multi-membered) are joined to form a new group. Finally all observations are grouped into one large group at end of n-1 steps. Grouping criterion: minimum within group sums of squares and maximum between group sums of squares. Any two groups are considered contiguous if any member of one group is contiguous to any member of the other group.

This grouping program has been used for economic sub-regionalisation of part of the central area of London using factor scores from analysis of spatial variation of office employment. Also for a regionalisation of Britain based on factor scores produced from a factor analysis of 24 S. I. C. employment variables by counties. This has been attempted for 1921, 1951 and 1961 data.

54/ Goldsmith, M. University of Salford, Salford 5.

KDF 9 Algol

54/1 by J. Whittaker Department of Sociology, Keele University.

and J. F. Hall Department of Transportation and Environmental Planning, Birmingham University.

Survey data transfer, correction, editing, tabulation package. Tabulation in up to 3 dimensions. Chi-square testing.

Program used for survey of student attitudes to facilities.

55/ Guerrero, R. and Hernandez H. Universidad de Concepción, Casilla 946, Concepción, Chile.

IBM 1620 II 40K 38K Fortran II

55/1 by M. Ramirez Casilla 1186, Concepcion, Chile.

Processing of the Housing and Population National Census. Due to the core limitations two linked programs were necessary to accomplish the job. First one reads the data from punched cards, checks for its consistency and simultaneously performs the respective matrix computations. The other program is exclusively for output purposes. The output consists of four cross tabulations for each census zone and nine for each district. Time for processing approximately 120, 000 cards (one card per person) grouped in about 50 districts and 400 zones was 11 hours.

Program used for determination of urban structures (internal structures of the city of Concepción.

56/ Hails, J. R. — Goldsmiths' College, New Cross, London S. E. 14.

IBM 650 & 709 — Fortran

Peripherals: manual keypunch, Model 10; automatic keypunch, Model 24 or 26; alphabetic interpreter, Model 557; document originating machine, Model 519; sorter, Model 087; accounting machine, Model 407.

56/1 by Collias, Rona, McManus and Creager — Department of Oceanography, University of Washington, Seattle 5, Washington, U.S.A.

Sediment description program which gives order statistics such as Trask, Inman, and Folk and Ward.

56/2 Moment measures program - of grain size distribution. First moment about the origin, the mean; the second moment about the mean, the standard deviation; skewness and kurtosis.

G. E. 225

56/3 by J. Webster and J. Schlee — Woods Hole Oceanographic Institution, Woods Hole, Massachusetts.

Grain-Size Data program whereby interpolation is made by fitting a series of overlapping parabolas to the data, and follows the method of Snyder. Mode(s), median, arithmetic mean, standard deviation, skewness and kurtosis are computed. The program calculates statistical parameters by the method of moments.

Programs used for statistical description of particle size distribution of sediments.

57/ Hamilton, P. and Sugden D. E. — Department of Geography, University of Aberdeen.

ICL System 4/50 — Fortran IV

57/1

Standard program for regression analysis.

Program used for distance analysis in the Bristol Region.

58/ Hansford-Miller, F. H. — 76 Lock Chase, Blackheath, London S. E. 3.

Atlas

58/1

Geography of Religion - The Clergy Deprivations, 1558-1564. Multiple regression analysis with two dependent and seventeen independent variables. Regression in specified steps and in stepwise introduction of variables in order of significance. Use of square of multiple correlation, F-values significant at 0.1%, 1% and 5% levels, and of residuals.

(Contd.)

58/2 Geography of Religion - The Archbishops's Report to the King, 1603 (The Harleian MS - British Museum). Multiple regression analysis with 19 dependent and 26 independent variables. Use of correlation matrix, F-values set at 5% level and residuals.

Programs used for research in 'The Geography of Religion'.

59/ Hardy, J. R. — Department of Geography, The University of Reading, Whiteknights, Reading, RG6 2AF.

Elliott 4130	32K	32K	Fortran IV	Optional: Mag. tape, graph plotter

59/1 by J. R. Hardy some parts modified from programs by W. Harrison and W. S. Wilson — as above

WAVREF, versions 1 to 4, calculates and plots wave refraction diagrams and coastal energy balances.

Program used for study of coastal wave energy balances, presently in Lake Erie.

60/ Hay, J. E. — Department of Geography, Kings College, Strand, London W.C.2.

Atlas	Fortran V
IBM 7040	Fortran IV

60/1 by Hay — as above

Calculation of vapour pressures and precipitable water from radiosonde ascent data.

60/2 Correlation and regression programs to establish empirical relationships between climatological parameters (absorbed shortwave and net radiation, surface vapour pressure and precipitable water in the atmosphere).

60/3 Program for the calculation of the radiation balance given: station latitude, time, surface air pressure, surface vapour pressure (relative humidity), cloud cover, surface albedo (reflection coefficient).

The programs are all related to an empirical evaluation of the component fluxes of the radiation budget of Canada and Alaska.

61/ Hernandez, H. — see Guerrero, R. 55/1

62/ Hill, R. D. University of Singapore.

IBM 360 Fortran

62/1 by E. E. Treloar c/o S.C.P., Pearl's Hill Terr., Singapore.

and IBM

Transforms in modal split analysis.

Program used for experimental analysis of vegetation structure in tropical rain forest.

63/ Hills, R. see Reynolds, S. 106/1

64/ Horn, C. J. Queen Mary College, Mile End Road, London E.1.

CDC 6600 6K Fortran

64/1 by C. J. Horn as above
and A. C. Binns
with modifications by Horn

Linkage Tree Analysis Program. A pairwise linkage process on a distance matrix calculated from original n x m data matrix. (n-observations in m-dimensional space). This process reduces number of groups from n to 1, and a hierarchical linkage tree is produced. Group centroid calculation is weighted according to number of members in the groups being linked. There is no contiguity restraint in this program.

Program used for identification of social areas in East London using census data (for both wards and enumeration districts). Program has also been used to identify rank in urban hierarchy.

65/ Huke, R. E. Department of Geography, Dartmouth College, Hanover, New Hampshire 03755, U.S.A.

GE 635 128K Basic

65/1 by Huke as above

KOPPEN. Produces Koppen climatic symbols from mean monthly temperature and precipitation data.

65/2 THORNY. Produces Thornthwaite climatic symbols from mean monthly temperature and precipitation data.

65/3 CLIMAT-1, 2, 3, 4, 5. Five computer assisted teaching programs. Each program asks a series of questions which lead to decisions about one type of climate based on Koppen system.

All programs used for teaching.

66/ Hutchinson, J. N. Department of Civil Engineering, Imperial College, London S.W.7.

IBM 7094 32K Fortran IV

66/1 by Margensterro University of Alberta, Edmonton, Canada.

and Price City University, London.

Slope Stability by Non-circular Analysis. The program analyses the stability of earth slopes, either man-made or natural, incorporating as required weak zones and differing strata. Potential slip surfaces are considered as a sequence of planes.

Program used for stability analysis of existing landslides, particularly if of non-circular cross-sectional form, and for the design of earth dams.

67/ Jennings, J. N. Australian National University, Canberra ACT 2601, Australia.

IBM 360/50 214K Fortran

67/1 by M. Rose Australian National University, Canberra ACT 2601, Australia.

Cave Survey. Calculation and adjustment of co-ordinates of survey points from compass bearing, distance and angle of sight.

Program used for plotting of cave surveys in Karst geomorphology.

68/ Jones, D. L. Department of Geography, Southern Illinois University, Carbondale, Illinois 62901, U.S.A.

IBM 360 / GE 625 10K Basic Teletype console, telephone line connections to computer

68/1 by Jones as above

Elementary Statistical Products. From numerical data supplied by the user, this program generates the following statistical products: for each of three groups of data - the arithmetic average, the standard deviation, the degrees of freedom for each group; among the three groups of data - standard error of difference of means between pairs of data groups, student's 't' ratios, sums of squares and mean squares between and within data groups, the F variance ratio, linear correlation coefficients, degrees of freedom of correlation and residual variances, correlation F ratios.

Program for student use in a course in Advanced Geographical Techniques and Application of Statistical Methods in Geography.

69/ Jones, G. E. — Department of Geography, University of Strathclyde, Livingstone Tower, Richmond Street, Glasgow, C.1., Scotland.

ICL 1907 32K — Fortran — MT decks

69/1 by ICL

ICL package program XDS 2. This program will perform many standard statistical tests including analysis of variance and multiple regression.

XDS 2 has been used to analyse air pollution data and numerous climatological data. It has also been used to find the relationship between timber production from a Forestry Commission forest and factors that were thought to restrict tree growth, e.g. soil parameters, climatic data, topographic data and air pollution figures. This was achieved mainly through the technique of multiple regression.

ICL 1907 32K — Fortran IV

69/2 by D. J. Unwin (modified) — Department of Geography, University College of Wales, Aberystwyth, Wales.

Simple two variable correlation. Program will accept up to 13 variables and produce a correlation matrix along with means, standard deviations.

Program used for correlation of air-borne sea-salt values with climatic data. Also used for correlating air pollution records and climatic data.

70/ Kennedy, Miss B. A. — Department of Geography, University of Cambridge, Downing Place, Cambridge.

IBM 360 44 — BCD, Fortran IV — 3 magnetic discs

70/1 by Univ. of Br. Columbia Computing Centre (for IBM 7090) rewritten by A. G. Tagg — Institute of Theoretical Astronomy, Madingley Road, Cambridge.

TRIP. This is a package program for a combination of: simple regression; multiple regression; stepwise regression; means, standard deviations and simple correlation coefficients; partial correlations; 't' test. It will, as modified for the 360, take up to 40 independent variables and running time for two multiple stepwise regression with nine independent variables is about 1.5 minutes.

Program used for analysis of variation in maximum angle of valley-side slope and of asymmetry in maximum angles.

72/ Kern, R. — see Rushton, G. 115/1

73/ Kissling, C. C. — University of Canterbury, Christchurch New Zealand.

IBM 360/44 128K — Fortran IV

73/1 by Kissling — as above

ACCESS. Computes minimum value paths between all pairs of nodes in a 125 node network - prints out value of routes, routing sequences and a variety of accessibility measures for nodes and link importance ratings.

Program used for derivation of graph theoretic measures of accessibility for transport research programmes. Smaller core machines with disc storage can also be used with a modified program.

74/ Lankford, P. — see Berry B. J. L. et al. 12/

75/ Levison, M. — see Ward, R. G. 144/

76/ Lewis, P. W. — Department of Geography, University of Hull, Hull, E. Yorkshire.

Elliott 803 8K — Algol

76/1 by Lewis — as above

Basic descriptive and test statistics and mapping programs.

Program used for an analysis of industrial location.

76/2 by Lewis and G. E. Skipworth — as above

Bivariate analysis and sequential analysis.

Program used in a study of election results.

77/ Lindgren, D. — Department of Geography, Dartmouth College, New Hampshire, U.S.A.

GE 635 128K — Basic

77/1 by Lindgren — as above

SOVIETAG. Simulates role of Soviet Minister of Agriculture. User must make series of decisions in an attempt to meet production quota.

Program used for teaching in Department of Geography, Dartmouth College, New Hampshire, U.S.A.

78/ Lockwood, J. G. — Department of Geography, University of Leeds, Leeds.

KDF 9 — KDF 9 Usercode

78/1 by Lockwood — as above

The study of nonlinear computer models of river catchments. The study of mathematical models of the generation of river run-off.

Program used for study of selected instrumented catchments.

79/ Long R. G. et al. — University of Tennessee, Department of Geography, Knoxville, Tennessee 37916, U.S.A.

IBM 360 — Fortran Cobol

79/1 by University of Tennessee Computing Centre Staff — as above

Multilinear regression correlation and rank correlation.

Program used for staff research and dissertation work by graduate students.

80/ Lycan, R. — Department of Geography, University of Victoria, British Columbia, Canada.

IBM 360/44 — Fortran — Calcomp plotter - optional

80/1 by Lycan — as above

Program analyses the structure of an interregional flow matrix. A flow matrix is first converted into a matrix of interregional distances (A). The distance matrix is non-symmetric, but can be expressed as the sum of a symmetric matrix (S) and a skew matrix (K), as A = S + K. The symmetric and skew matrices are factored into components via eigen-analysis. The eigenvectors associated with the larger eigenvalues then locate the regions in a space which may involve only a few dimensions. The program consists of a main program and five subroutines.

Program is being used to analyse patterns of interregional migration in the United States and Canada. Regions are located in migrant's distance space and migrant's preference space. Matrices analysed have been of order 4 to order 10. Larger matrices can be accommodated by the program.

81/ McAlpine, J. R. — Division of Land Research, CSIRO, P. O. Box 109, Canberra City, ACT 2601, Australia.

CDC 3600 — 32K — 24K — Fortran — Digital plotter - optional

81/1 by Gael, Keig and McAlpine — as above

WATBAL. A package of programs designed to apply generalised water balance models using only readily available climatic data. The package analyses and summarises the results of soil moisture etc. estimates.

81/2 CUMULUS. Analyses daily rainfall data to provide frequency distribution of amounts, sequential events and other statistics. All output is optional in choice and arrangement.

81/3 QUANTILE. Provides medians, quartiles, percentiles of actual or transformed monthly data (or any other data of similar form, variable dimension being used). (Contd.)

A series of programs aimed at automating the production of climatic analyses and reports. This is only a selection of programs used in CSIRO - a full entry will appear in the next edition.

82/ McCullagh, N. J. — Department of Geography, University of Nottingham, Nottingham.

KDF 9 — 32K — Algol

82/1 by McCullagh — as above

Trend surface analysis. Map production of 1st, 2nd, 3rd order plus confidence surfaces.

KDF 9 — 32K — Fortran

82/2 Diffusion model.

KDF 9 — 32K — Fortran/ Usercode

82/3 Network analysis by shortest route methods.

KDF 9 — 32K — Atlas Autocode

82/4 Spit simulation model.

KDF 9 — 32K — Fortran

82/5 Questionnaire answer counting program.

KDF 9 — 32K — Atlas Autocode

82/6 Population potential model.

83/ Mabbutt, J. A. — School of Geography, University of New South Wales, Kensington, N.S.W. Australia.

CDC 3600 — Fortran — on line consoles

83/1 by M. J. Goodspeed modified by P. Ewens — Division of Land Research, CSIRO, P. O. Box 109, Canberra City, ACT 2601, Australia.

Edtrace, used from consoles or on-line teleprinters to edit data, by asking a series of questions in logical order. Program works on drum data as paper - tape or logical cards, will generate a magnetic tape, cards or a document for disc storage.

Program used for editing wind-velocity and wind-direction data from arid Australia. Program originally designed to edit hydrologic data and can be used for this. Pen-traces are first converted to tape on a strip-chart conversion unit. Used in connection with other CSIRO library programs, data can be corrected (HYDCIDER), several data units may be joined (MELD), or magnetic tapes may be made at any stage using the EDTRACE program. From a condensed print-out, errors from the recording instruments are immediately identified, and a correction is possible.

84/ Massey, J. S. — University of Melbourne, Parkville, Victoria 3052, Australia.

IBM 360-65 200K — Fortran IV

84/1 by H. T. Fisher — Lab. for Computer Graphics, Harvard.

SYMAP, version V - mapping program used for the production of choropleth, isopleth, and proximal map.

Program has been used to display data relating to population density, rainfall and natural land types.

IBM 7044 — Fortran and Object

84/2

Factor Analysis with varimax rotation - calculates means, standard deviations, table correlation coefficients, trace, communalities, eigenvalues, principal axes factors, communalities, factor variance, percentage variance, cumulative variance, varimax factors.

Program has been used to assist in isolating land types.

85/ Mather, P. M. — Department of Geography, University of Nottingham, Nottingham.

KDF 9 32K — Fortran (Egtran)

85/1 by Mather — as above

Factor analysis, Q and R mode. Up to 110 variables.

85/2 Cluster analysis, Q and R modes, using correlation coefficients and distance functions.

85/3 Discriminant analysis, with sequential elimination of unimportant variables.

86/ Mattsson, J. O. — Institute of Physical Geography, University of Lund, Sweden.

SMIL — Algol

86/1 by S. Nordbeck — as above

Stepwise regression.

Program used for microclimatic studies.

87/ Maxted, G. M. — see A. Philips 99/1

88/ Miller, V. P. — Indiana University of Pa., Indiana Pa., 15701, U.S.A.

WANG — WANG (numerical code)

88/1 by Miller — as above

Transformation of percentage landuse data to absolute data, calculation of densities (people/total area), people/agricultural area, people/pasture land, people/non-agricultural land, and the reciprocals of these densities.

Program used for a study of agricultural self-sufficiency on a world-wide basis.

88/2 The Farming Game. An adaptation of the 'farming game' from the high school geography project (U.S.A.). The program attempts to add the dimension of culture to the calculation of environmental risk (as presented by the high school geography project). Thus the program enables the student to use the Wang computer in a laboratory session to play this game and evaluates the results of his answers using a chi-square test. The student would actually go through the program four times, with the rules of the game modified to fit certain cultural expectations (Scandinavian, German, Italian, Polish), having the value of illustrating to the student different standards of efficience in different cultures.

Program used for teaching of geography. Eventually this program is to be used in an automated teaching of geography laboratory, similar in purpose to the language laboratory widely used in the U.S.

88/3 by M. Luckas — Goldsmiths College, University of London.

Crop combination regions using the nearest neighbour method of P.J. Clark and F.C. Evans.

Program used for teaching-research.

89/ Moffatt, C. — Department of Economics and Geography, University of Salford, Salford 5.

KDF 9 — Algol

89/1 by J. Whittaker — Department of Sociology, Keele University.

and J. F. Hall — Department of Transportation and Environmental Planning, Birmingham University.

Survey data transfer, correction, editing, tabulation package. Tabulation in up to three dimensions. Chi-square testing.

Program used for study of absenteeism in Philips factory in Glasgow.

90/ Monmonier, M. S. — Department of Geography, University of Rhode Island, Kingston, Rhode Island 02881.

IBM 360/67
IBM 1401 — Fortran IV — Calcomp plotter

90/1 by Monmonier — as above

Programs to measure elevation and slope-related parameters from digitized contour maps and to correlate digitized maps. A digitized map, as used in this project, consists of a map that is divided up into a large number of small cells in rectangular array form. Similar digits are used to represent a relatively homogeneous region. Contour lines are represented by long, thin, connected regions. Since the regions are represented by numbers in an array, these maps can be processed by computer. Two or more maps can be sampled for correlation by accessing the digital values at similar points on a variety of overlays. To measure slope or elevation on a digitized contour map a search is begun around a point for contour lines. The relative elevations of the contour lines encountered are used; together with the distances from the cell in question to the contours encountered, to determine elevation, maximum slope, direction of maximum slope, or slope in a particular direction. One routine permits a geodesic path to be followed across a digitized contour map; this procedure is useful for sampling.

Programs used to investigate methods whereby digitized maps might be analysed directly by computer instead of requiring measurements to be made manually.

90/2 GIPSY (Geographic Incremental Plotter SYstem). Used to prepare thematic maps with various symbols plotted at prespecified data points. The symbols consist of cubes and tetrahedons (both of which are scaled according to the cube of the values at the points), circles (scaled according to the square of the values at the points), and various dot symbols. GIPSY is a plotter supplement to SYMAP.

90/3 by Pennsylvania State University Computation Center

Simple correlation coefficients, factor analysis, varimax rotation, multiple regression and canonical correlation.

Program used with George A. Schnell of State University College, New Paltz, New York, in studying farm mechanization in New York and Pennsylvania.

91/ Morrill, R. et al. — Department of Geography, University of Washington

IBM 7090-94
CDC 6400 — Fortran IV mostly

91/1

Interaction simulation. Used for the evaluation of distribution of services after predicting flows.

91/2 Optimum allocation.

Used for generalized location problems. (Contd.)

91/3 Various modifications of existing grouping programs.

92/ Murray, M. A. — Department of Geography, Georgia State University, 33 Gilmer St., Atlanta, Ga. 30303, U.S.A.

RCA Spectra 70/46 128K — Fortran IV

92/1 by Laboratory for Computer Graphics, Harvard University — Harvard University, Massachusetts, U.S.A.

SYMAP. Versatile computer mapping program.

Program used for classification of the U.S. by counties, Georgia by county civil divisions and Atlanta SMSA by census tracts and census blocks. Also demographic data for England and Wales by parish.

93/ Newby, P. T. — Hendon College of Technology, Department of Management and Business Studies.

English Electric 450 64K — Fortran

93/1 by J. E. Chambers — Applications Programmer, Computer Unit, North Park Road, University of Exeter.

Spatial running means, smoothing over an area 7 cells x 7 cells and 13 cells x 13 cells.

Program used for study of building density. Suitable for any data (e.g. population characteristics) in an areal matrix. Can be modified by a spatial weighting function.

93/2 Means, standard deviations, square roots of summed squared differences.

Program used for study of differences in people's judgements of landscapes using techniques established by Osgood et al. ('The Measurement of Meaning', Urbana 1957).

94/ Nunnally, N. R. — see Alexander, C. S. 4/1

95/ Orchard, A. Q. — see Sumner, G. N. 130/

96/ Østrem, G. — Glaciology Section, Norwegian Water Resource and Electricity Board.

Univac 1107 — Fortran IV — D-Mac Linefollower

96/1 Division of Hydrology — P.O. Box 5091, Oslo 3, Norway.

Computation of Glacier Volumes. The program computes accumulation/ablation of a glacier for different height-intervals and puts the results into a table. The observations of snow-heights on snow stakes are manually checked, plotted on glacier maps and isolines drawn. (Contd.)

The contours of the glacier, height-intervals and isolines are then digitalized by the D-Mac Linefollower, which, together with some identifications, makes the input to the program. The output is a table containing the volumes within different height-intervals and the total volume in different units.

The program was made for rapid and correct computations of ablation or accumulation of a glacier. By minor corrections, it can also be used for several other purposes, namely volume computations of lakes, precipitation, snowcover, etc.

97/ Payne, C. — School of Arts and Social Studies, University of Strathclyde, Glasgow C.1.

ICL 1905

97/1 by C. Payne and W. Miller — as above

A package of survey data handling programs.

97/2 by H. Mackintosh — as above

Further Analysis programs.
SAD1. Principal components analysis with varimax rotation.
SAD2. Product moment correlation matrix, means and standard deviations.
SAD3. Chi-square for general m by n contingency table.
SAD4. Column counts.
SAD5. Guttman scalogram analysis.
SADA. Dunn Rankin scale program - converts paired comparisons into rank orders and derives scale scores from cumulative rank totals.

ICL 1905 — Fortran

97/3

SFAS. Calculates standardised mortality ratios - data then mapped by SYMAP.

This is a selection of programs available from C. Payne.

98/ Perry, A. — Department of Geography, University of Southampton, Southampton, SO9 5NH.

ICL 1907 — Fortran

98/1 by ICL

Multiple correlation/regression program used for an analysis of regional climate and synoptic indices.

98/2 Principal component analysis programs investigating circulation patterns and pressure anomaly patterns in recent decades.

98/3 Factor analysis program.

98/4 Multiple regression program that regresses any of the input variables against any subset, prints out residuals, Durban-Watson statistics, etc., and prints correlations, coefficients of variation etc.

(Contd.)

Program used in a study of turbulent heat flux patterns over the North Atlantic.

98/5 Statistical Analysis. XDS2 - package of programs including principal component analysis and factor analysis.

Program used for an analysis of British rainfall patterns to isolate major monthly anomaly patterns for further analysis.

99/ Philips, A. and Maxted G. M. — Department of Environmental Sciences, University of Lancaster, St. Leonard's House, St. Leonardgate, Lancaster.

ICL 1909

99/1

Computer programs under development for wind and wave data processing and morphometric analysis.

100/ Pitty, A. F. — Department of Geography, University of Hull, Hull, E. Yorkshire.

Elliott 803 8K — Elliott autocode and Algol

100/1 by Pitty — as above

The calculation of moving means, regression, partial correlation and correlation analysis, chi square and other statistical tests.

100/2 Multiple regression analysis, test of normality and contingency tables.

100/3 A number of programs specifically for karst water data analysis and slope angle analysis.

These programs used for an analysis of stream flow and solute fluctuations in karst water, and also for slope angle analysis.

101/ Poole, M. A. — Department of Geography, Queen's University, Belfast, N. Ireland.

ICL 1909 — Fortran

101/1 by R. W. Ewart — as above

Data processing - used for interview analysis concerning fuel and power resources.

101/2 by M. A. Poole — as above

Statistical analysis - simple and multiple regression.

Programs used in a study of electricity consumption in the Irish Republic.

102/ Porteous, J. D. — Department of Geography, University of Victoria, Victoria, British Columbia, Canada.

IBM 360/44 256K — 90K max. — Fortran & PL1

102/1 by J. Green with C. N. Forward and J. D. Porteous — as above

GEODOC. System for bibliographical listing of geographical references.

Allows continuous updating of references. Acts as data bank for output of listings by author, region, subject, topic, etc.

103/ Prior, J. C. — see Alexandra, C. S. 4/1

104/ Randall, H. A. — Department of Geography, University College of Wales, Swansea, Glamorgan.

KDF 9 — KDF 9 User Code with Algol procedures

104/1 by Wilson, Cox and Miller

Analysis and tabulation of survey material. Prints contingency, univariate, bivariate and frequency distribution tables.

This program is used to analyse Eighteenth Century Parish Registers. It has also been used in the Newcastle Maternity Survey, the Survey of General Practitioners (by the Durham Business School) and in a housing survey in Newcastle.

105/ Rens, F. J. — Department of Geography, University of Buffalo, 4224 Ridge Lea Road, Amherst, N.Y. 14226, U.S.A.

CDC 6400 60K — 28K — Fortran — Plotter

105/1 by Rens — as above

CONTOUR. Produces contour maps and annotation from a geographic matrix.

Used for contouring.

105/2 TRIDIGRAM. Produces block diagrams and 3-dimensional histograms from a geographic matrix.

Program used for presentation of urban data, marketing research.

CDC 6400 60K — 28K — Fortran Compass

105/3 by H. T. Fisher — Laboratory for Computer Graphics, Harvard University, Cambridge 02138.

SYMAP. Printer plotting program.

This is the only CDC 6400 version available.

106/ Reynolds, S. — South Pacific Regional College of Tropical Agriculture, Alafua, A.P.A., Western Samoa.

Elliott 503 — Algol

106/1 by M. Reynolds — as above

Soil Moisture 3. Given weights of wet sample + tube, dry sample + tube, and tube, program calculates %moisture content (weight basis); for each sub-group of n individuals, program calculates arithmetic mean, standard deviation, best estimate of standard deviation and required sample sizes with certain standard errors, as well as a set of 'corrected by t value' sample size estimates because of the small initial sample sizes used by the author in generating best estimate of standard deviation values.

Program was used in research work in soil moisture variability. Program enabled a rapid compilation of variability data to be made so that ideas of required sample size were quickly generated and the many factors influencing soil moisture variability could be studied.

107/ Rhind, D. — Experimental Cartography Unit, Royal College of Art, Kensington Grove, London S.W.7.

KDF 9 16K — Atlas Autocode — Magnetic tape deck

107/1 by Rhind — as above

MAINPROG. A program for retrieving, sorting onspecified criteria and graphically portraying various aspects of drift borehole data. It includes the following routines as options: Locmap - a distribution mapping routine; Trendpack - a trend surface calculation and contour mapping routine; Histogram - histogram plotting routine.

107/2 Write to File. A family of programs for writing fixed and free format borehole data to KDF 9 magnetic tape.

107/3 SURRUF. A surface roughness calculation program.

IBM 360/50 — Fortran — Magnetic disc and tape

107/4 by H. T. Fisher et al. — Laboratory for Computer Graphics, Harvard, Massachusetts, U.S.A.

SYMAP 5. Automatic contouring program. FLEXIN sub-routine reads in data from magnetic tape and sorts it on specified criteria.

107/5 by O'Leary, Lippert & Spitz

Kansas Geological Survey, Computer Contribution 3. Trend surface calculation and mapping program up to 6th order.

107/6 by Davis & Sampson

Kansas Geological Survey, Computer Contribution 19. A family of four time trend programs.

(Contd.)

107/7 by IBM

IBM utility programs, IEUPDE and IEBGENER, for writing card facsimiles to IBM magnetic tape.

108/ Richason, B. F. — Department of Geography, Carroll College, Waukesha, Wisconsin.

IBM 1130 Mod 2B with 1 disk drive — 1130 Fortran

108/1 by IBM

1130 Test Scoring System. Scores and analyses multiple choice tests. Input may be on porta-punch cards. Provides score distribution, including frequency, percentile rank, Z-score, T-score, and class rank. Provides general item analysis, item analysis on only upper and lower 27 per cent of the population, index reflecting difficulty of each item and discrimination.

The beginning physical geography course at Carroll College has been totally committed to independent study by means of the Audio-Visual-Tutorial system of instruction. The program aids in monitoring student progress, and helps the instructor modify both course content and examination procedures.

108/2 by C. L. Miller and Staff M. I. T.

Civil Engineering Co-ordinate Geometry (COGO). The student states problem in familiar vocabulary and statement input generates problem solution. No intermediate programming is needed.

Program used to check student work on closed traverse in geographic field methods. Output includes closure distance, azimuth of closure line and accuracy ratio.

108/3 by various student assistants — Computing Centre, Carroll College, Waukesha, Wisconsin 53186.

Audio-Visual-Tutorial Educational Research.

Program used for correlation of test scores and AVT carrel usage.

108/4 by Michael Noth

Cross-Tab. Simple tabulation and cross-tabulation for multiple responses on questionnaires.

Program used to analyse student opinions concerning work in the Audio-Visual-Tutorial geography laboratory. Also used to determine composition and attitudes of membership of the National Council for Geographic Education.

109/ Riess, R. O. — 164 Pleasant Street, Marblehead, Mass. 01945, U.S.A.

GE 365 — Fortran — Teletype console

109/1 — Marketing Operations Inc., Boston, Mass.

MULFIT. A multi-variate regression program which will take up to six variables, computing regression coefficient, means, standard deviations, standard error of estimate and regression residuals.

(Contd.)

Also available in a form which gives correlation coefficient.

Program used for analysing census and other data to determine urban fields in rural areas in the general vicinity of Kingston, Jamaica.

110/ Robinson, G. — Department of Geography, Monash University, Clayton, Victoria, Australia.

IBM 7044 — Fortran IV
CDC 3200 — Fortran 32

110/1 by Whitten

Partial trend surface analysis. Grid point output for trend surface maps.

110/2 by Brent

Line plot of any mathematical surface. Line plot of contours for any set of spatially distributed values.

Programs used in applying trend surface analysis to country towns of Victoria (with K. J. Fairbaim of Melbourne University), and to cirque distributions in Tasmania (with J. A. Peterson of Monash University).

110/3 by Efroymson

Stepwise linear regression (library program for IBM 7044).

Program used primarily for a statistical testing of sets of factors which are significantly related.

111/ Robinson, R. — University of New South Wales, Wollongong University College, New South Wales, Australia.

IBM 7044 — Fortran IV

111/1 by University of British Columbia Computing Centre

Factor analysis of shipping movement patterns.

Program used to identify shipping movement patterns and identify major port linkages.

111/2 Commodity movement matrix - import cargoes.

Program used to identify patterns of movement of import shipping cargoes through the port of Vancouver.

111/3 Port network matrix.

Program used to establish patterns of shipping movement in Western Canada.

112/ Robertson, Isobel M. L. — Department of Geography, University of Glasgow, Glasgow, Scotland.

ICL KDF 9 32K — 300 words — Algol

112/1 by Mrs C. Bateman

'Floating circle' technique.

Program used to calculate the size of population within specific distances from certain locations.

113/ Rosing, K. E. — Department of Geography, King's College, Strand, London W. C. 1.

IBM 360/65 — Fortran IV

113/1 by Rosing — as above

Chi square test for goodness of fit for the Zipf urban size/rank rule.

Program used for a study of city size in selected countries showing different 'stages' of development. Also in an historical study of one case in the nineteenth and twentieth centuries.

113/2 Simple correlation and regression for matrix up to 60 x 60.

Program used in geomorphological investigations and airport employment investigations.

113/3 Program for isoline computer mapping (SYMAP) accepts data X, Y and Z values, and interpolates isolines. Linked to trend surface program as an output routine.

113/4 Choropleth computer mapping routine.

114/ Rowley, G. — Department of Geography, University of Sheffield, Sheffield 10.

Elliott 703 — Elliott Autocode

ICL Mercury — Mercury Autocode

114/1 by D. F. Mayers
modified by P. H. Blundell
and Miss N. George

Correlation and multiple regression analysis, with printing and display of residuals.

114/2 by G. E. Forsythe

Curve fitting using orthogonal polynomials.

Both programs used in the analysis of central places in S. W. Wales.

115/ Rushton, G. — Department of Geography, University of Iowa, Iowa City, Iowa 52240, U. S. A.

CDC 3600

115/1 by G. Rushton — as above

and R. Kern — Computer Institute for Social Science Research, Michigan State University.

REVPREF: paired comparisons analysis from revealed spatial preference data. Program applies the method of paired comparisons to data describing spatial choice and develops a proximity matrix which describes the aggregate perceived similarity (distance) between 'locational types'. A 'locational type' is a combination of a distance interval separating the individual from an opportunity for interaction and an interval along some measure of the in situ attraction of the opportunity as specified by the user. The theory and methods of scaling applied to the proximity matrix produced by this program can be used to discover the scale-values, the least squares trend surface of which is the function required. Data necessary to run this program consists of:-

1. A map of all conceivable opportunities for interaction together with the user's measure of the in situ attraction of each opportunity. This information must be coded.
2. A map of individuals and information on which of the opportunities were selected for the particular purpose. More than one selection is possible.

115/2 by G. Rushton — as above

and W. A. V. Clark — Computer Institute for Social Science Research, Michigan State University.

CONDIST computes the spatial relationship between a sample of points and a distribution of different sized facilities. The program computes the number of points within specified distances of facilities larger than specified sizes. Also computed are the distances separating successive percentile groups of the points from their nearest facility larger than a specified size (percentile groups are based on points ranked by computed distances). This is repeated for many facility size limits.

115/3 by G. Rushton — as above

SOLUP: simulation of land use patterns. Program used to construct a map on the printer on which the land use activity which would earn the highest 'economic rent' is computed and identified for each point location. 'Economic rent' is computed from the well-known formula: $R = E(p-a) - Efk$. SOLUP allows a map to be specified with markets (no more than seven) and their product prices (no more than six products). Yields vary over the map area independently for each product from specified locations but in all cases as a linear function of distance from this location.

(Contd.)

Costs of production vary over the map area independently for each product but in all cases as a linear function of distance from a specified route (or river). Transfer costs are directly proportional to distance and may vary from one product to another. Thus all variables in the formula for economic rent may change in value over the map area.

116/ Scarlett, M. J. — Department of Geography, University of Calgary, Calgary 44, Alberta, Canada.

IBM 7090 — M. A. D.

116/1 by Scarlett — as above

Shortest Path by Cascade Algorithm. The program computes all shortest distances in a matrix A, together with a routing matrix, R, according to the Cascade Algorithm of J. D. Murchland et al.

Program used in transportation studies.

IBM 360/50 — Fortran IV

116/2 Matrix Powering for Arc Values of a Communications Net. Given a binary matrix, A_1, of connectivity in a graph without circuits, where the a_{ij} are arcs, the program computes powered matrices, A^1, A^2 . . . A^n, until all elements of A^n equal zero; sums rows or columns of $(A^1 + A^2 + . . . + A^n)$; and finally computes square root for each row or column sum.

Program used in transportation studies - flow in a network.

117/ Schnell, G. A. — see Monmonier, M. S. 90/3

118/ Schofer, J. P. — Department of Geography, Rutgers University, New Brunswick, New Jersey 08903.

IBM 360-67 — Fortran

118/1 by Harvard Lab. for Computer Graphics

SYMAP - computer mapping routines.

Program used for computer mapping as a teaching aid.

118/2 by Univ. of Kansas State Geological Survey

TRENDS - trend surface mapping.

Program used for mapping trends for social-spatial research.

118/3 by IBM

MPS 360 - linear programming.

Program used for linear programming for optimal network flows and real world deviations; costs of cultural biases in migration patterns.

119/ Schove, D. J. — see Gaudeau, C. 47/1

120/ Sengenberger, D. — Department of Geography, Wisconsin State University, Stevens Point, Wisconsin 54481, U.S.A.

IBM 1130 — Fortran

120/1 by R. Beier — Wisconsin

Climatic Year Köppen Climatic Classification. Program designed to give Köppen climatic symbol classifications for station data on an annual April - March basis, utilizing Köppen's basic climatological classification as modified by Trewartha, Sutherlund, Shear, Russell, Sengenberger and others.

Program used for research into more accurate generalized regional climatic classification.

121/ Smith, D. E. — Lanchester College, Coventry.

IBM 7094 32K — Fortran II

121/1 by E. H. Whitten — Northwestern University

Surface-fitting program for irregularly-spaced map data. Calculates linear, quadratic and cubic coefficients, also percent sum of squares and total sum of squares for each surface.

Elliott 803 8K — Elliott Algol

121/2 modified by F. Nex — Cambridge.

As 121/1 with a mapped output.

Programs used for mapping of raised shorelines in Scotland.

122/ Smithson, P. A. — Department of Geography, Birkbeck College, Malet Street, London W.C.1.

Atlas — Fortran IV

122/1 by Krumbein and Allen

Trend surface analysis degree 1-3.

Program used in a study of rainfall distribution over Scotland, applying rainfall totals for different synoptic situations to a grid covering the area and obtaining a trend surface of the rainfall.

123/ Spence, N. — see Goddard, J. 53/

124/ Stallings, E. F. — Box 3530 USL Station, University of S. W. Louisiana, Lafayette, Louisiana 70501.

IBM 1130 | 8K | Fortran IV | disc memory unit

124/1 by L. Landry — Department of Mathematics, University of S. W. Louisiana, Lafayette, Louisiana 70501.

Sorting routines.

Program was used to order an extremely large mass of data collected for the purpose of a content analysis of five of the major American geographical journals. No statistical computations were made.

125/ Stewart, J. — Department of Geography, The University College of Townsville, Douglas, Townsville, Queensland, Australia.

IBM 1620 | 60K | 9.9K | Fortran II

125/1 by Stewart — as above

FORCEL. Program to apply Fisher exact probability test to discrete data in 2 x 2 table format.

Program used for sociological research projects, Department of Education, University College of Townsville.

IBM 1620 | 60K | 5K | Fortran II | Incremental plotter

125/2 DEPLOT. Program to plot curve of cumulative percentual deviations. Size of plot 8" x 10". Written for IBM 1627 model (Calcomp) plotter using PLOT and CHAR routines.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 | 60K | 39K | Fortran II

125/3 by Stewart — as above

And A. A. Richardson — Department of Mathematics, University College, Townsville, Queensland, Australia.

MULCOR. Program to compute an intercorrelation matrix for up to thirty variables each having up to seventy values. Upper triangle of matrix may be punched. Printed output is in tabular form, one page for each variable. Each table lists variables, correlation coefficients, significance of coefficients (t test - normal distribution assumed).

Program used in a study of climatic fluctuation in northern Queensland.

(Contd.)

IBM 1620 | 60K | 14.3K | Fortran II

125/4 by Stewart — as above

TISCOR. Program for partial and multiple correlation of time series. In the partial correlation, time is held constant. Any number of series may be correlated in turn with a reference series.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 | 60K | 8K | Fortran II | Incremental plotter

125/5 by Stewart and A. A. Richardson — as above

INPLOT. Program to plot curves of annual rainfall and a selected running mean. Size of plot 8" x 10". Y axis scaled 0" - 120". Time scale 100 years. Written for IBM model 1627 (Calcomp) plotter using PLOT and CHAR routines.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 | 60K | 19K | Fortran II

125/6 PARAIN. Program for the preliminary processing of climatological series. Program computes, prints and punches mean, deviations from mean, cumulative percentual deviations from mean, mean deviation, sample standard deviation, relative variability, coefficient of variability, unweighted 5, 7 and 11 year running means. Punched output is optional. Series may be up to 100 years in length.

Program used for research into climatic fluctuations in northern Queensland.

IBM 1620 | 60K | 6.5K | Fortran II

125/7 by Stewart — as above

PHICHI. Program to compute chi-square and phi coefficient for data in 2 x 2 contingency table format. Data must satisfy Cochran's prerequisites for use of chi-square test. Chi-square and phi are interpreted. Program is written for volume processing.

Program used for sociological research projects, Department of Education, University College of Townsville.

IBM 1620 | 60K | 16K | Fortran II

125/8 MULCHI. Program to compute chi-square and contingency coefficient for data in contingency table format. Tables may be up to 10 x 10 in size. Data must satisfy Cochran's recommendations for use of chi-square test. Output is comprehensive. Program is written for volume processing.

Program used for sociological research projects, Department of Education, University College of Townsville.

IBM 1620 | 60K | 13K | Fortran II

125/9 DATHOM. Program to test climatic data for relative homogeneity applying the Abbe criterion (after Conrad).

(Contd.)

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 17.5K Fortran II

125/10 TESLIN. Program test linearity of the regression function and performs linear regression of the first kind for grouped samples, two variables.

IBM 1620 60K 13.7K Fortran II

125/11 PROFIT. Program carries out chi-square test for goodness of fit to normal using either ten or fifteen equally probable intervals. Minimum sample size fifty values.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 50K Fortran II Disk drive

125/12 KOCLAS. Program to classify climate according to Köppen system (Trewartha version). Program uses climatological normals and/or annual records as data. If annual records are used output is in the form of 'climatic year' classifications (October through September sequence). A tally of climatic years is kept for A, B and C climatic types. This program is IBM 1620 orientated and would require extensive modification for use on other machines.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 13.5K Fortran II

125/13 TISRAN. Program to test time series for independence. Program counts turning points and analyses distribution of phase lengths.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 4.9K Fortran II

125/14 RANGEN. Program to produce simulated time series up to 100 years in length. Program assumes availability of IBM subroutine RAND (1620 file number 07.0.059) by Donald L. Fink, IBM Corporation, Maryland, or its equivalent.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 19.6K Fortran II

125/15 FISHRG. Program to test data for normality using Fisher g_1 and g_2 statistics. Data may be grouped or ungrouped. Output is interpreted.

Program used in a study of climatic fluctuations in northern Queensland.

(Contd.)

IBM 1620 60K 18.1K Fortran II Incremental plotter

125/16 AUTCOR. Program to carry out autocorrelation analysis of time series to N - 35 lags. Technique is from Brooks and Carruthers: Handbook of Statistical Methods in Meteorology (1953) pp. 360 - 362. A correlogram may be plotted. (Plotter subroutine written for IBM (Calcomp) plotter model 1627 using PLOT and CHAR routines).

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 48K Fortran II Incremental plotter

125/17 TESCHI. Program to describe the statistical characteristics of data with regard to central tendency, dispersion and form. Skewness, kurtosis and goodness of fit to normal are tested and interpreted. A histogram of observed frequencies with interpolated normal curve may be plotted. (Plotter subroutine written for IBM (Calcomp) plotter model 1627 using PLOT and CHAR routines).

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 16.2K Fortran II

125/18 RUNTES. Program to perform one-sample runs test for randomness using deviations from mean.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 11.9K Fortran II

125/19 RANSEQ. Program to test time series for non-randomness using mean square successive difference method. Normal distribution is assumed.

Program used in a study of climatic fluctuations in northern Queensland.

IBM 1620 60K 23.1K Fortran II

125/20 by Stewart and A. J. Dobson — as above
Department of Mathematics, University of S. W. Louisiana, Lafayette, Louisiana 70501.

POLREG. Program to fit polynomials up to quartic. Output is in the form of an analysis of variance table.

Program used in a study of climatic fluctuations in northern Queensland.

126/ Stoppard, D. see Clarke, B. 21/5

127/ Storrie, M. — Department of Geography, Queen Mary College, Mile End Road, London E. C. 1.

Atlas — ACl

127/1

Standard statistical tests and ranking by approximation. Calculation of histogram data.

Atlas — Algol

127/2

Calculation and plotting of histograms.

Programs used in a study of household tenure in the British Isles, 1961.

128/ Sugden, D. E. — see Hamilton, P. 57/1

129/ O'Sullivan, P. — The University, Bristol 8.

CDC 6600 System 4 — Fortran

129/1 by A. Wilson — Centre for Environmental Studies, 5 Cambridge Terrace, Regent's Park, London N. W. 1.

Gravity Program. This program reads a flow matrix Tij, a distance matrix dij preceded by a control card which sets the parameters for a gravity model. It then calculates a new flow according to either a doubly or singly constrained gravity model procedures.

Program used to calibrate models of interregional freight flows in Great Britain.

130/ Sumner, G. N. and Orchard, A. Q. — Department of Geography, University of London, King's College, Strand, London W. C. 2.

Atlas — Fortran V

130/1 by Sumner and Orchard — as above

Quality Control. Atlas library subroutines SAVE and CONTXQ are used, the program is thus machine dependent. Autographic rainfall charts are digitised on to five-hole paper tape using a D-Mac co-ordinate reader. Additional information from the charts is hand punched to the tape. The information on the tapes is output in a convenient and readable form for checking. The program also calculates 'true time' elapsed on the chart, 'chart time' elapsed and percentage error.

(Contd.)

130/2 TOT. Takes the co-ordinate data from the D-Mac (after it has been tested on program 130/1 and finds the total rainfall for each storm, and its digitised length in minutes. A correction can be applied in terms of a known time error for each chart. Output gives corrected times for the beginning and end of each chart and storm. (Largest array dimension 1000X 2).

130/3 TOTALS. Same input as program 130/2. Minute by minute rainfalls are calculated and summed for each storm. These are corrected for syphonage error, and for errors caused by the operator not digitising exactly on the minute lines of the chart. The storm duration and minute totals are then corrected for the percentage time error on the chart. Lastly, maximum intensities and running totals are calculated for various time intervals during a storm (5, 10, 15, 30, 60 and 120 minutes). A final total of rainfall for the entire chart is output at the end. (Maximum array dimension 7 x 1000).

130/4 CCPR (Co-ordinate Conversion Program). A simple program to convert point sites on a map to cartesian co-ordinates, using the D-Mac digitiser. Co-ordinates are printed out from an origin in the south-west corner, in kilometres. A correction is applied to allow for non-alignment of the map with the axes of the digitiser.

131/ Symons, L. J. — University of Canterbury, Christchurch, New Zealand.

Atlas — Atlas Autocode — MT drives

131/1 by University of Manchester

RUSAGMAP. Modified after CANAP program of Department of Geography, University of Edinburgh. The modified program developed at Manchester is for use with magnetic tape for successive use of selected blocks of stored data.

Program used for distributional maps for economic data of the RSFSR.

132/ Talomb, B. — University of California, Santa Barbara, California 93106, U.S.A.

IBM 1710 — KLIC — 3 Tape units

132/1 by IBM

Permutation indexing - automatically creates an index out of an unsorted list.

Program used for searching and sorting ofdescriptor entries from unsorted lists.

133/ Tarrant, J. R. — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C, Norfolk.

Elliott 803 8K — Algol
Atlas — Algol

133/1 by Tarrant — as above

and B. Duffield — Department of Geography, University of Edinburgh, Scotland.

Agricultural data processing. Calculations of basic agricultural statistics including Weaver-Thomas classification procedures to produce agricultural regions according to enterprise combinations.

ICL 1905 E 32K — 15K — Fortran IV

133/2 by Whitten, — Kansas State Geological Survey, University of Kansas.

Tarrant, — as above

and Treutler, O. — University of East Anglia Computer Centre, Norwich, NOR 88C, Norfolk.

Trend surface analysis with plot of computed values and residuals at the location of the data points in the form of coded symbols output in position by a lineprinter.

Program used in an analysis of agricultural patterns in the Republic of Ireland and East Anglia.

133/3 by Tarrant — as above

Taperead. Reads magnetic tape records, matches and produces cards or printout as output.

Program used for reading grid references of the centroids of areal units from one magnetic tape file and agricultural data from another tape file, matching the two and producing output in the form of cards as input for program 133/2 or as printout.

133/4 by Thompson — Computing Centre, University of East Anglia, Norwich, NOR 88C, Norfolk.

Tape translation.

Program used to change magnetic tape from format used by the Ministry of Agriculture to one readable by ICL 1905 in Fortran.

133/5 by ICL

XDS 2. Statistical analysis. Correlation, multiple regression, component analysis, factor analysis.

Program used primarily for student exercise and study of agricultural variables.

134/ Taylor, A. H. — Department of Geography, University of Southampton.

ICT 1909 — Fortran

134/1 by Taylor — as above

Multivariate classification programs:-

(a) Group average hierarchical sorting strategy using Euclidian distance as measure.
(b) Other group average hierarchical sorting strategies using correlation coefficient as distance measures.
(c) Furthest neighbour hierarchical sorting strategy using Euclidian distance or correlation coefficient as distance measure.

Programs give print out of matrix of distance measures and a list of individuals remaining unclassified with their variable scores. Programs can deal with 45-50 individuals using 32K storage.

Programs are being used in an analysis of British general election results since 1918.

135/ Taylor, D. R. F. — Carleton University, Colonel By Drive, Ottawa 1, Ontario.

IBM 360-50 — 30K — Fortran 4 — Digitizer

135/1 by Harvard Univ. — Laboratory of Computer Graphics, Harvard, U.S.A.

SYMAP 5. Program for direct computer maps.

Program is being applied to Canadian statistical information and to Kenyan statistical information for research purposes. Computer graphic techniques are also being taught to undergraduates and graduates as a research tool.

136/ Thomas, G. S. P. — Department of Geography, University College of Wales, Aberystwyth, Wales.

Elliott 4130 — Fortran IV
IBM 1620 — Fortran II

136/1 by Thomas — as above

Statistical tests - 2 variable linear regression, analysis of variance and multiple factor correlation matrix.

136/2 Determination of fabric strength for two-dimensional 'Rose Diagram' distribution.

136/3 Description and testing of three-dimensional till fabric distributions.

136/4 Roundness, shape, flatness and volume etc. of sedimentary particles.

(Contd.)

136/5 Two phase program for grain size analysis:-

(a) Calculation of Folk-Ward statistics, cumulative percentages etc.
(b) Interpolation of standard half-phi size units and curve plotting using line plotter.

These programs are being used for description and testing of till fabric distributions and sediment analysis as a part of a research programme on the slope deposits of the northern uplands of the Isle of Man.

137/ Thompson, D. — Department of Geography, University of Maryland, College, Park, Maryland 20742, U.S.A.

CDC 3600 — Fortran

137/1 by Dept. of Prev. Medicine & Pub. Health — UCLA, U.S.A.

BMDO1D. Simple statistical analysis and histo-program and scatter diagram plotting.

137/2 BMDO2D. Simple statistical analysis and histo-program and scatter diagram plotting.

137/3 BMDO5D. Simple statistical analysis and histo-program and scatter diagram plotting.

137/4 BDMO3M. Principal components analysis with factor rotation.

137/5 BDMO5M. Discriminant analysis.

137/6 BDMO2R. Correlation and regression analysis with calculation of residuals and plot of the regression curve.

Program 137/5 used in a study of urban areas in England and Wales. The remainder used in a statistical analysis of population growth and redistribution in the U.S.A. (1950-1960).

138/ Thornes, J. B. — London School of Economics, London.

CDC
IBM 360 (2) — Fortran IV

138/1 by Thornes and Howard — as above
as above

PEBPROB II. Computes size, shape and roundness statistics for pebble data, greater than one phi. Modified from PEBPROB I (1967).

Program used for scree and river particle analyses.

138/2 by A. Armstrong — as above

Drainage simulation program - computes random drainage patterns with constraints e.g. relief, coastlines.

Program used for project on drainage simulation.

(Contd.)

138/3 by Thornes — as above

Slope simulation program.

Program computes random slopes with vertical and horizontal constraints for work on indices of slope measurement.

139/ Timofeeff, N. P. — Department of Geography, State University of New York/Binghamton, Binghamton, New York 13901, U.S.A.

IBM 360/40 260K — 200K — Fortran IV

139/1 by Timofeeff — as above

Water Budget Simulator and Climatic Classification. This program classifies meteorological stations into climatic groups based on both the Köppen and Thornthwaite systems. It also calculates the water budget, on a monthly base continuously for up to 600 months, giving potential evapotranspiration, soil moisture, water balance, and river discharge. Input to the program is monthly temperature and precipitation, latitude and elevation of station, and water holding capacity of soil. Graphic output is optional.

Program is used for river discharge simulation, prediction of flood probability, calculation of soil moisture conditions and irrigation requirements, and micro climatic classification.

IBM 360/40 260K — Fortran IV

139/2 by J. Rubin and H. Friedman — IBM Corporation, NY Scientific Center, New York, N.Y. 10022, U.S.A.

Cluster analysis and taxonomy system for grouping and classifying data.

Program used for classifying vegetation into floristic associations, also grouping soils into multivariate categories.

139/3 by Dept. of Preventive Medecine & Public Health — School of Medecine, University of California, Los Angeles, U.S.A.

Factor Analysis - BMD X72.

Factor Analysis is used to classify agricultural land into multi-factor groups and to evaluate the productive potential of each group.

139/4 Discriminant Analysis - BMD 07M.

Program used to test the homogeniety of the groups and to reclassify peripheral locations.

140/ Tinkler, K. J. — Department of Geogr aphy, Birkbeck College, Malet Street, London W. C. 1.

KDF 9 — Fortran IV

140/1 by Krumbein & Allen modified by Cullens — Computation Department, University of Liverpool.

Trend surface analysis (linear, quadratic and cubic surfaces). A separate print-out for each surface on a regular grid for convenient plotting up to 35 x 35 grid intersections.

Program used for the analysis of the volume of volcanic cones in the Canary Islands, seeking localised areas of intensive volcanism.

141/ Unwin, D. J. — Department of Geography, University College of Wales, Penglais, Aberystwyth, Wales.

ICL Elliott 4130	32K	3K	Algol

141/1 by Unwin — as above

Data Screening. From unlimited input computes means, standard deviations variance/ covariance matrix, standard scores for all variables, histograms in units of standard deviation, chi-squares against normal distribution, correlation matrix, matrix of t values of correlation coefficients, eigenvalues and vectors of correlation matrix, principal components and (optional) rotation of this according to the varimax criterion.

Program used as a preliminary to many other investigations. Slope profile analysis and in landscape evaluation experiments. Has been run successfully with 30 variables.

ICL Elliott 4130 — Algol & Fortran

141/2 by Universi ty College of Wales — Penglais, Aberystwyth, Wales.

Miscellaneous statistical analysis programs including discriminate function, multiple regression, simple linear regression, chi-square.

Program used for general data analysis.

141/3 by Unwin — as above

Trend surface analysis programs. Four currently in use:-

(a) Simple adaptation of the Whitten (1963) program. Up to 8 variables, unlimited number of cases. Program segmented into two halves.
(b) Algol version of the above.
(c) Algol program. Computes surfaces for degrees 1-5, for any number of variables (25 have been run) up to the machine limit. Output can be varied to suit user requirements but can include data listing, UV matrix, matrix inverses, 10 x 10 grids of

(Contd.)

computed values for mapping the surfaces, computed and residual values for all degrees and variables for all control points. Summary statistics.
Used in the analysis of geochemical data (Phillips), soil pH (Davies), erosion surfaces (Lewin), agricultural data (Aitchison) and in investigations on the 'significance' of trend surfaces (Unwin).
(d) UVW trend analysis. Fortran modification of the Peikert (1963) program.
Used in the analysis of rainfall distribution.

ICL Elliott 4130		Algol	Benson Lehner model 4296 plotter

141/4 by Unwin and R. A. F. Sharman — as above

Programs for computer graphics:-

(a) MAPS. Automatic contouring of irregularly spaced point data according to the SYMAP algorithm.
(b) PROPSYM. Proportional symbol mapping.
(c) GRAINS. Calculation and plotting of grain-size distribution curves.

142/ Wang, I-Shou — Department of Geography, San Fernando Valley State College, Northridge, California 91324, U.S. A.

GE 225	8K	Fortran II
GE 415	32K	Fortran IV

142/1 by M. Scripter — as above

Chormap Program. To prepare choropleth maps with line printers of small-memory digital computers.

143/ Ward, R. C. — Department of Geography, University of Hull, Hull, E. Yorks.

Elliott 803	8K	Elliott Autocode

143/1 by C. P. Young modified by Ward — as above

Calculation of evaporation using Penman's formula.

143/2 by Ward — as above

Evaporation loss from evapotranspirometers.

143/3 Correlation, regression analysis, standard deviations and period and running means.

Programs are used for the study of evaporation and evapotranspiration problems in general and for water balance problems in selected catchment areas in particular.

144/ Ward, R. G. with Levison, M. et al — Department of Geography, University College London, Gower Street, London W.C.1.

Atlas — Algol

144/1 by M. Levison, W. A. Sentance & T. I. Fenner — as above

Simulation study of Pacific winds, currents, island locations and voyages by small vessels.

Program used to test the possibilities of inter-island contact by drift voyages and hence to test certain theories of Polynesian migrations.

145/ Warnes, A. M. — Department of Economics and Geography, University of Salford, Salford 5.

KDF 9 — Algol

145/1 by Warnes — as above

Processing of published journey to work statistics, including resolution of vectors of % of e.a. population x distance of journey to work for local authorities.

Program used in study of changing patterns of journey to work in N.W. England.

146/ Watts, H. D. — University of Sheffield, Sheffield S10 2TN.

Atlas & IBM 1620 — Fortran

146/1 by C. D. Payne — School of Arts and Social Studies, University of Strathclyde, Glasgow C.1.

Shift Analysis. Calculates percentage change and net shift expressed as a per cent of either estimated or actual figures. The process is repeated to take into account population change.

Program used for analysing shifts in the food and drink industries, over periods 1861-1921, 1921-1951, 1951-1961, using counties as the basic units.

147/ White, H. P. — Department of Economics and Geography, University of Salford, Salford MS 4WT.

KDF 9 — Algol

147/1 by J. Whittaker — Department of Sociology, Keele University, Staffs.

and J. Hall — Department of Transportation and Environmental Planning, University of Birmingham.

Salford Multi-variate Counting and Tabulation System. ! Five program package for transfer of data from punched tape to magnetic tape, correction of errors, tabulation of one, two, or three-dimensional tables, and testing for chi-square. (Contd.)

Program used for tabulation of a number of sample survey questionnaire material.

148/ Wilbanks, T. J. — Department of Geography, Syracuse University, Syracuse, New York 13210, U.S.A.

IBM 360-50 512K — Fortran IV

148/1 by S. Tweedie — c/o Department of Geography, Syracuse University.

Cultural Gradient Analysis - centroid grouping approach to cluster discrimination, also identifying statistical 'linkages', adapted for SYMAP printout.

148/2 by P. Lentz — c/o Department of Geography, Clark University, Worcester, Mass.

Principal component analysis with orthogonal varimax rotation.

Both programs used primarily as regionalisation tools.

149/ Young, A. — School of Environmental Sciences, University of East Anglia, Norwich, NOR 88C, Norfolk.

ICL 1905 E 32K — 8K — Fortran IV

149/1 by Young — as above

Slope Profile Analysis. Reads angle and distance data of a slope profile. Apportions the profile into optimal rectilinear segments and curved elements, according to specifications prescribed by the user.

ICL 1905 E 32K — 10K — Fortran IV

149/2 Slope Co-ordinates. Reads angle and distance data of a slope profile. Calculates horizontal and vertical co-ordinates, curvature, rate of change of curvature, log.tan. angle, curvature of log.tan. angle.

ICL 1905 E 32K — 11K — Fortran IV

149/3 SUMANGLE and SUMCURVATURE. Reads angle and distance data of a slope profile. SUMANGLE sums and tabulates total distances at each angle for up to 16 coded classes (e.g. rock or vegetation types), giving means, standard deviations. SUMCURVATURE calculates curvature and sums and tabulates distances at each curvature, convex and concave separately, giving means and standard deviations.

Programs are used to analyse slope profiles from the Mato Grosso, Brazil.

150/ Lewis, P. W. additional to 76/ — University of Florida, Gainesville 32601, U.S.A.

IBM 360 — Fortran PL/1

150/1 by S. Gladin, J. Ingalls & J. Keech — as above

Trend surface mapping programs.

150/2 Factor Analysis programs.

Both programs applied to agricultural and Latin American data.

150/3 SYMAP.

150/4 Standard programs of statistical analysis.

151/ Ward, R. G. — University of Papua and New Guinea, Box 1144, Boroko, Papua, New Guinea.

IBM 1130 — Fortran

151/1 by B. Phillips — Department of Computing Science, State University of New York, Buffalo, New York, U.S.A.

Calculating crop (or other) combinations using Weaver-Thomas method.

Program used for preparation of crop combination and religion combination maps for Papua and New Guinea.

152/ Experimental Cartography Unit — Royal College of Art, 37A St. Giles, Oxford.

DIGITAL PDP-9 16K — Fortran IV — 3 DEC tapes, 2 IBM compatible MT units, Geagraph plotter

152/1 by D. Vicars — as above

MTTDT. Translates the output tape from the DMAC pencil follower to a form convenient for further processing. Output is to DEC tape.

152/2 JOIN. This program joins together sheets which have been separated for digitising on the DMAC pencil follower. A bi-linear transform is calculated from a least squares routine and is used to rectify the data. This process removes small linear distortions. An X and Y offset, at scale, is also calculated. The output is a multi file magnetic tape.

152/3 by D. Vicars and T. Lang — as above

GEAG. This program plots an output tape from JOIN on the Geagraph plotter. Principal facilities are file selection, scale change juxtaposition of sheets by application of offsets, and generalisation for small scale plotting.

152/4 by D. Vicars — as above

SAMPLE. Measures line lengths, calculates point totals and densities with averages and standard deviations.

152/5 by T. Lang — as above

ARMES. Area measurement using Simpson's Rule for unequal intervals.

152/6 by D. Vicars and J. Adams — as above

ANAGEA. As 152/3 but produces anaglyph maps.

152/7 by D. Vicars — as above

MTEDIT. Program to provide elementary editing facilities for data from DMAC.

152/8 GRATDT. Generates a Mercator graticule between specified units at a specified scale.

152/9 PROJCH. Provides transformations between several standard projections using spherical projection formulae, with pole change on output for skew and transverse projections.

152/10 by D. Connelly — as above

FIGURE. Generates a regular figure field from randomly distributed points using a weighted mean interpolation scheme.

152/11 CONTOR. Scans the figure field to produce contours. Output is via a cubic polynomial interpolation routine.

Programs used in automated cartography project.

153/ Fysisch-Geografisch en Bodemkundig Lab. — Universiteit v. Amsterdam, Dapperstraat 115, Amsterdam, Oost, Holland.

Electrologica X-8 — Algol

153/1 by Oosterbaan — as above

Calculation of granulometric analysis of soil samples. Output gives granulometric compositions. Input: results of analysis done in the Laboratory.

153/2 Calculation of chemical composition and C. E. L. of fraction less 1 micron of soil samples. Analysis done with Philips X-ray fluorescence spectrograph.

154/ International Minerals & Chemical Corporation — P. O. Box 867, Bartow, Florida, U. S. A.

IBM 360/25 32K — Cobol — 3 2311 Disks

154/1 by D. R. Brandt et al. — as above

Phosphate Reserves Evaluation. Using raw prospect data as the data base, a series of program produce various types of reports covering such areas as reserves catalogs, area summaries, mine maps and mining simulation.

Prime purpose of program is an evaluation tool used by the mine planning staff. It is an aid for effective scheduling of the mining operation.

155/ Department of Geography, Northwestern Univ. — Northwestern University, College of Arts and Sciences, Evanston, Illinois 60201.

CDC 6600 64K — Fortran IV

Mostly by D. F. Marble and M. F. Dacey — as above

The department has over 100 computer programs - details are listed in Marble, D. F. Some Computer Programs for Geographic Research, Special Publication No. 1, Northwestern University Department of Geography, 1967. A revised and extended second edition will be in print shortly.

156/ University of Bristol Dept. of Geography — Bristol.

Elliot 503 — Algol

156/1 by R. R. White — as above

CHOY. This program computes individual and cumulative Poisson probabilities for integer values up to 800 (may be further - not tested yet beyond this). Input allows for values representing different total populations. Two vectors constitute the only input, other than parameter card. Vector one records population total for each cell. Vector two contains the number of observed occurrences for the same counties. An overall mean probability of occurrence per capita is computed and from this an expected number of occurrences per county is calculated. This expected value is the mean for the Poisson distribution for each county. The observed occurrence is compared with this distribution and left- or right-tail cumulative probability is computed (depending on whether the 'observed' is less than or greater than the 'expected' value). Individual probability printed out. Incidence per capita for each county also printed out.

Atlas — Fortran IV

156/2 by W. James — State Geological Survey, University of Kansas.

Program for fitting double Fouier series to irregularly spaced data.

Elliot 503 — Algol

156/3 by K. Bassett — Department of Geography, University of Bristol, Bristol.

Linear programming transportation problem, using stepping-stone method.

156/4 by R. Tinline — as above

DISCRIM. This program computes a linear multivariate discriminant function with k independent variables. Output also includes an F test, and Mahalanobis D^2 as a measure of the 'distance' between the multivariate means. The percentage contribution of each variable to this 'distance' is also given.

156/5 CLUSTA. This program reads in the grid co-ordinates and dates of several events, then calculates all possible time and space 'distances' between events. The number of events in each time-space 'box' may be compared to random expectation using the program 156/6.

156/6 CLUSTR. This program is generally meant to be used with 156/5. It is a simulation program and generates random co-ordinates for events and random times for the events. It then classifies these random events into time-space 'boxes'. The process is repeated as many times as necessary to obtain a random expectation for pre-specified time-space boundaries.

156/7 LAGRES. This program computes the 'serial' or 'auto' correlations for various lags for any series of data.

156/8 RATIO. This program computes the ratio of values of a series at various prespecified distances (lags) apart.

(Contd.)

156/9 COLLECT. Input data consists of grid references (plus dates if desired) of various events. The program, in effect, lays a grid over the map of these events and counts the number of events occurring in each grid cell. Output consists of a map grid with numbers of events in each cell recorded. There are a number of options in this program.

156/10 SPECTRA. Input data consists of any number series of fluctuating data. The program computes the power spectrum of each series (using Parzen's weights) then computes the cross spectrum and coherence for every possible pair of series and computes the average coherence for every pair of series.

156/11 This is a multiple regression program. Options include various transformations, data printout and residuals.

156/12 SREG. A least squares regression program incorporating many options.

156/13 CORREL. This program calculates the Pearson product moment correlation coefficient between all possible pairs of rows in a data matrix.

156/14 SPEAR. This program calculates the Spearman rank correlation coefficient between all possible pairs of rows in a data matrix.

156/15 SPC. This is a principal components program incorporating a Spearman rank correlation matrix rather than a Pearson product moment correlation matrix.

156/16 STND. This program was originally designed to read in areas and populations to calculate densities. The user has an optional choice to calculate means and standard deviations and express the densities in standardized from. Incidences or many other forms of data adjustment may be calculated in this way. Input consists of the populations, then the areas (or equivalent data).

156/17 UDIST. This program calculates all possible distances from given reference points. Input consists of the co-ordinates of the reference point and the co-ordinates of the sites to be checked against the reference point.

156/18 by G. B. Norcliffe, Department of Geography,
University of Bristol.

TRENDA, TREND Part II. Computes first, second and third order power-series polynomial trend surfaces and does an 'F' test. The program plots the initial data and the three surfaces on the lineprinter.

156/19 POTENTIAL. Computes a population potential surface.

156/20 COSID. Generates and amalgamates various sine and cosine series.

156/21 CHISQ. Computes chi-square for sets of data.

156/22 MARKOV. Given a matrix of inter-state movements:-

(a) Computes transition probability matrix.
(b) The configuration vector of a first order Markov chain up to the equilibrium state.
(c) Prints out equilibrium transition probability matrix.
(d) Computes mobility indices.

(Contd.)

156/23 FILTER (2D). Specify a series of filters. These are put through a 2D array by pre and post multiplication. Variance is computed after each cycle.

156/24 FILTER (1D). Specify a series of filters. These are then put through a series, filtering it and computing variance after each cycle.

156/25 by A. D. Cliff Department of Geography,
University of Bristol.

HISTSTAT 1. Computes the first four central moments of a frequency distribution, and the Pearson measures of skewness and kurtosis, b_1 and b_2.

156/26 HISTAT 2. Computes the first four central moments of a frequency distribution, the Pearson measures of skewness and kurtosis, b_1 and b_2, and the S and I indices (Ord., Beometrika, 1967).

156/27 by G. Mills Department of Economics,
University of Bristol.

Mixed Integer/Linear Programming. Solves linear and integer programming problems.

156/28 by P. Haggett Department of Geography,
University of Bristol.

DIAPIVOT. Calculates minimum paths in a graph between each node and all other nodes using Murchland diagonal pivot method.

IBM 1620 Fortran II

156/29 NESTING II. Nested analysis of variance and covariance for several sampling designs.

156/30 AUTOCORR. Autocorrelation and spectral analysis.

156/31 PRINCOMP. Principal components analysis, Hotelling version.

Elliot 503 Algol

156/32 AUTOCORR. Discriminant analysis for two variables.

156/33 by A. D. Cliff as above

OCGRAM. Computes correlogram between first, second . . . n-order neighbours in a lattice. Uses the Cliff-Ord measure of spatial autocorrelation.

156/34 ZGRAM. Computes the correlogram between 1st, 2nd . . . nth nearest neighbours in a lattice. Measure of correlation is Pearson's r. r is tested for significance using Fisher's Z transformation where appropriate.

156/35 SIMULATION. For a given county system and set of data, generates t values of the Cliff-Ord spatial autocorrelation coefficient.

156/36 SIMREG. Simulates the frequency distribution of the Cliff-Ord autocorrelation coefficient used to test for spatial correlation in regression residuals.

(Contd.)

156/37 AUTORESID 1, AUTORESID 2. Evaluate and test for significance the Cliff-Ord measures of spatial autocorrelation in regression and trend surface residuals.

156/38 by P. Haggett as above

NESTING. Nested analysis of variance under a hierarchical sampling design.

156/39 by A. D. Cliff as above

SKEWNESS. Evaluates the Pearson measures of skewness and kurtosis for BB and BW joins in two colour lattices without vacancies. Various definitions of 'contiguity' are included.

156/40 CONRAT. Tests for randomness/non-randomness in the distribution of B and W counties in a two colour lattice. A parametric test.

156/41 NONPARA. Carries out a nonparametric test of randomness using chi-square in the spatial pattern of black and white counties in a two colour lattice.

156/42 KCOLOUR. Carries out a parametric test of randomness in the spatial pattern of counties of all colours in a k-colour county system.

156/43 SPEARMAN. Computes the Spearman rank correlation coefficient. Does not allow for tied ranks.

156/44 by P. Haggett as above

ELNODAC. Computes the shortest path matrix for a binary graph.

156/45 by A. D. Cliff as above

PCIA. Computes Pearson correlation matrix, variance/covariance matrix for a set of variables, and extracts the principal components using the Jacobi method.

156/46 PCIB. Computes Pearson correlation matrix, variance/covariance matrix for a set of variables, and extracts the principal components using Householder's method.

156/47 ROTATION. Uses the varimax criterion to obtain a rotated factor solution from a set of orthogonal unrotated principal components which are read in.

156/48 ZCORREL. For observation on k variables for n individuals, this program computes:-

(a) mean, variance, standard deviation, b_1 and b_2, standard scores for each of the k variables,
(b) Pearson's correlation matrix.

156/49 by P. Haggett as above

HARMONY. Simple harmonic analysis. Limited to the first 6 cycles.

156/50 by A. D. Cliff as above

INTERVAL. Computes Moran's coefficient of spatial autocorrelation, I, between contiguous counties in a county system. I is tested for significance.

(Contd.)

156/51 by P. Haggett as above

DISCOEFF. Distance correlation program based on the Harbaugh index. Alternative distance transformations possible.

IBM 1620 Fortran II

156/52 DISCRIM. Discriminant analysis for two variables.

157/ University of Canterbury, Dept. of Geography — Christchurch, New Zealand.

IBM 360/44	Fortran IV
IBM 1620	Fortran IV

Members of the Department of Geography in Canterbury are making extensive use of computers with both general and special purpose programs. Although a complete list of the programs is not yet available, the following is a list of active programmers on the staff and their fields of interest:-

C. C. Kissling	Economic geography, esp. transport systems
D. E. Greenland	Climatology
R. G. Cart	Cultural geography - esp. of agriculture
R. J. Johnston	Social and urban geography
D. C. Johnston	Agricultural and transport geography
R. M. Kirk	Coastal geomorphology

A course in computer programming (Fortran IV) is given by C. C. Kissling to all honours students so that most are able to use computers in their research. About half of the 12 M. A. theses in 1967 used computer techniques.

158/ University of Kansas, Kansas State Geological Survey — Lawrence, Kansas 66044, U.S.A.

GE 635	Fortran II
IBM 1130	Fortran IV
IBM 360/40, 360/50, 360/65	& Algol

More than 50 programs have been published dealing with trend analysis, classification, correlation, simulation and statistics for use by earth scientists and others since 1963.

159/ University of Newcastle, Dept. of Geography — New South Wales 2308, Australia.

IBM 1130 16K Fortran IV Disk

159/1 by I. Beaman, P. Cook & N. Patterson as above

Land Use Mixture Index - calculates an index of the mixture of land uses (non-areal) per city block, with uses standardised to the mean residential plot size. Based on sociological index of qualitative variation.

159/2 Shevky-Bell social area typology including printout in rank order with conversion factors. 'Social rank' and 'urbanisation' index.

(Contd.)

159/3 Various measures of concentration and segregation.

159/4 Library routines for factor analysis, regression analysis etc.

These programs are being used in a number of small studies in urban Newcastle.

160/ University of the Witwatersrand, Geography Department — Johannesburg.

IBM 360 — 180 bytes — Fortran IV

160/1 by C. S. Keen — c/o Department of Geography, University of the Witwatersrand, Johannesburg.

Spectral analysis.

Program used for spectral analysis of winds, especially local and valley winds. This includes both horizontal and vertical components. Also used for rainfall analysis - to analyse periodicity over time for Johannesburg.

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The main subject headings for the uses to which these programs are being put are listed below. Some of the categories are necessarily very broad: basic statistics includes univariate and bivariate statistical procedures; geomorphology includes those subjects not included within coastal studies, hydrology, glaciology or soils; and graphics includes all those programs that have some form of mapped output.

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Information needed for Entries in Computers in Geography

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Computer used	Core size of machine and core required by program if known	Peripherals needed
Language of program	Author of program	Address of author

Title and brief description of program. (List each one separately. If details above are different for different programs, please complete a separate form for each)

Purpose for which the program is being used

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